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THE
STANDARD SYSTEM
OF
DYNAMO-ELECTRIC MACHINERY
AND ACCESSORIES
STANDARD
ELECTRIC
CO.
CHICACO
U.S.A.
Ne plus ultra
KARSTEN & KNUDSEN

The Standard System

OF

Dynamo-Electric Machinery

AND

Accessories.

STANDARD ELECTRIC CO.,

CHICAGO, U. S. A.

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INTRODUCTION.

THE phenomenal success which has attended the introduction and use of the Standard Series Arc System establishes fully the reliability of the principles involved in its construction, and demonstrates the advantages gained when these principles are directly applied to other forms of dynamo-electric machinery. Working from this standpoint, a year or more has been devoted to designing and perfecting a complete line of apparatus for all purposes, and the formal presentation of Standard apparatus for arc, alternating and direct current work is herein made. In addition to dynamos and motors, the Company has also perfected, on entirely new lines, a complete complement of accessories, such as instruments, switches, transformers, etc., which will be fully illustrated in the accompanying catalogue.

The Standard system of electrical machinery is as near perfect in regulation, efficiency and general construction, both mechanical and electrical, as can be obtained. Painstaking electrical engineering, punctilious attention to all details of mechanical construction, the use of the finest grades of metals and materials entering into the construction of the apparatus, and the employment of a liberal factor of safety in rating capacity, place this Company's new apparatus, in its completed condition, in the same prominent position which the Standard arc system has heretofore enjoyed, viz : the front rank in modern electrical machinery.

This Company recognizes the fact that there are in the field other manufacturers, but a comparison of Standard apparatus and accessories with the products of other manufacturers cannot fail to forestall

any question of doubt as to our thorough knowledge of dynamo construction and operation. The problems involved in dynamos, transformers, station equipments, etc., and the precautionary measures to protect the apparatus against accidents, have been taken up from a comprehensive standpoint, with a thorough understanding of the advantages of dynamo-electric machinery generally, and by reducing the defects and incorporating important improvements we are enabled to offer superior apparatus covering the full scope of the advanced science of electrical engineering.

The apparatus herein described is manufactured under United States letters-patent owned or controlled by the Company.

Special emphasis may be given to the fact that the interests of the purchaser have been closely consulted in the manufacture of all apparatus offered by this Company, inasmuch as all screws, bolts and nuts used are made from standard commercial taps and dies. Repairs may, therefore, be made quickly and at small cost, no matter how remote the plant may be from the home works. All parts necessary to be had from the factory are made to gauge and are interchangeable, so that an order for any broken piece can be supplied on short notice.

Respectfully,

STANDARD ELECTRIC CO.

Chicago, May, 1894.

Standard

Apparatus and Accessories.

Series Arc,

Alternating,

Direct Current.

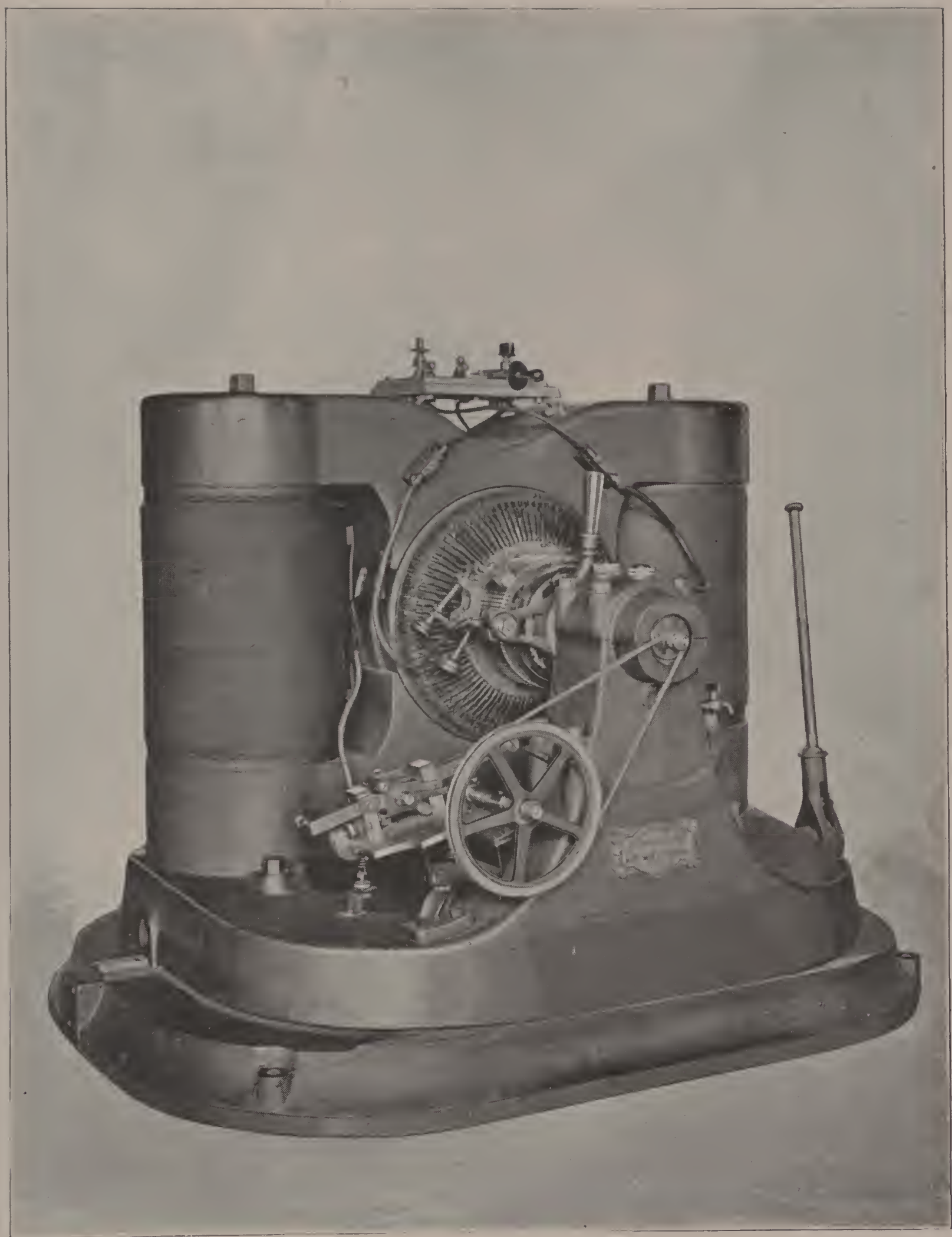
The Standard Series Arc Dynamo.

THE Standard Series Arc Dynamo in design presents some special features, in which the form of the well-known Manchester type of field has been carried out. The pole pieces, which form the main portion of the frame, are of special cast iron, and the field magnet cores employed are of wrought iron. These pole pieces, with their cores, which contain the magnetic circuits of the apparatus, are insulated from the base by a distance piece of brass or zinc, thus reducing the magnetic leakage to a minimum, and giving a uniformity of lap to the brushes on either side of the commutator. The range of the brushes from the neutral point between the sparking point on either side causes a variation of nearly one ampere. The total change of load leaving the brushes standing at the non-sparking point does not exceed one-quarter ampere.

The switching device on the terminal board permits the full load of the machine to be thrown on or off without any unnecessary sparking or kindred trouble at the commutator or brushes. The switch first short-circuits the fields, cutting them out of the external circuit, and then short-circuits the armature on its own terminals.

By removing the pedestal at either end of the shaft, the armature may be taken out or replaced, or the same result may be accomplished by taking off the upper pole piece and raising the armature from its position in this manner.

The capacity of these dynamos is always 10% in excess of their commercial rating, which 10% is allowed as a reserve for drop of potential in external circuits. The heat developed never exceeds a rise of 80° Fahr. above the surrounding atmosphere.



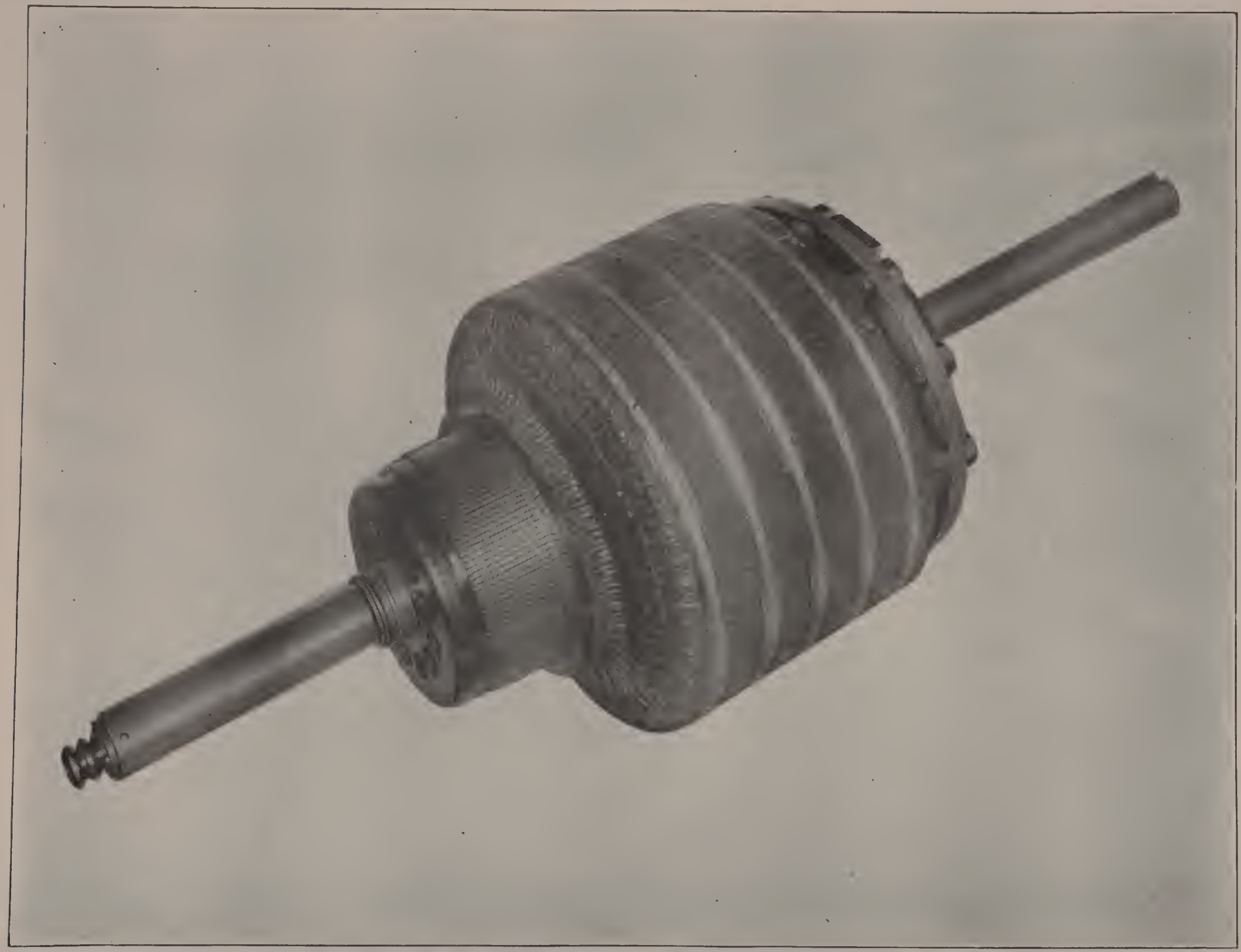
SERIES ARC DYNAMO.

PLATE I.

Armature for Series Arc Dynamo.

ARC ARMATURES of our latest improved type are made in sizes ranging from 20 to 150 lights capacity, inclusive. In addition to our system of winding, which divides our armature into a large number of sections and a consequent low voltage between adjoining coils, an important improvement has been made in the commutator, which is more fully mentioned elsewhere.

In general construction the core and mounting is practically the same as used in our arc armatures for several years, during which time our dynamos have made records never before approached. The low internal resistance, method of insulation, and the electrical proportioning with relation to the fields, combine to secure the superior performance and high efficiency of the armature.

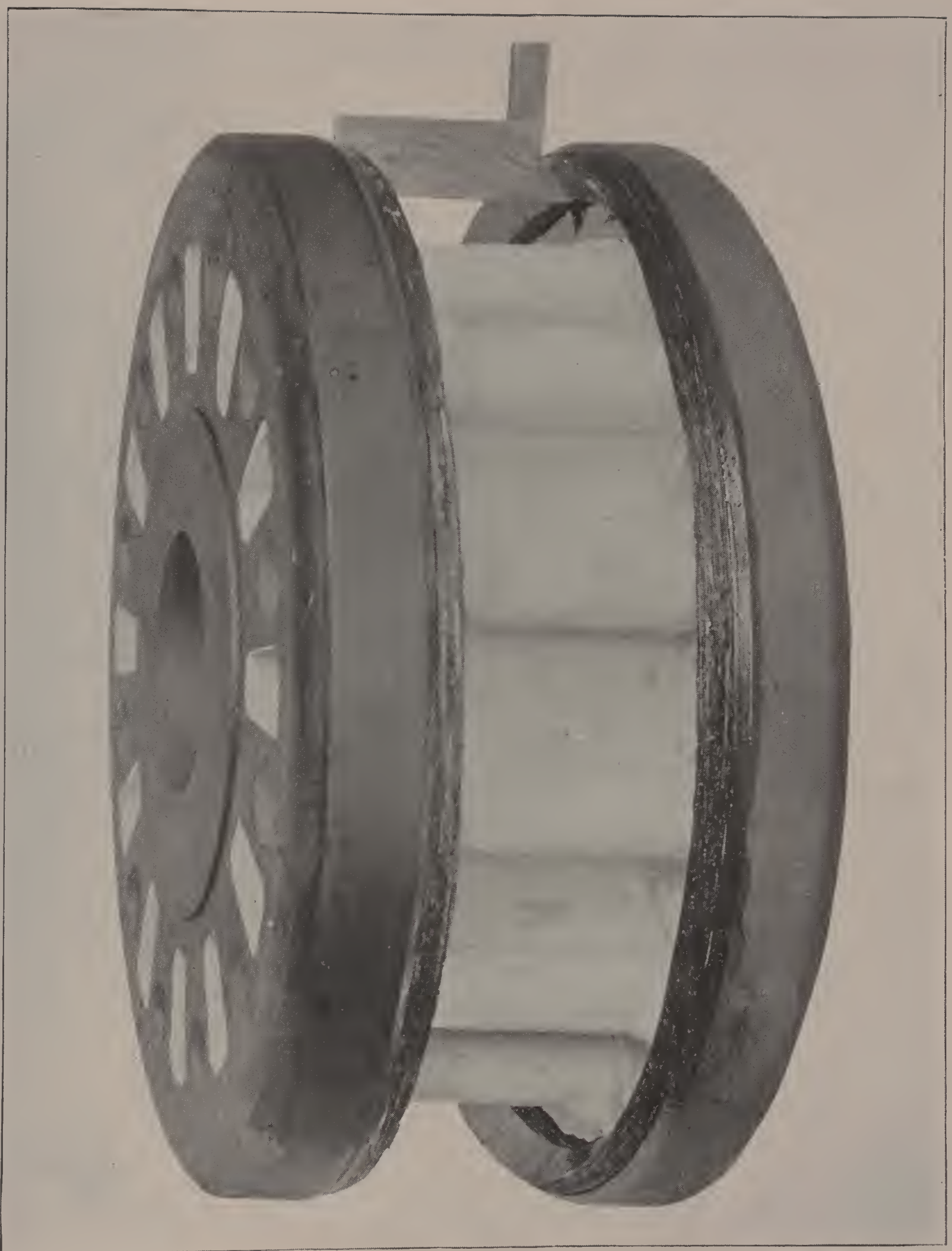


ARC ARMATURE, COMPLETE.

PLATE 2.

Arc Commutator Frame or Thimble.

ON the opposite page will be found a representation of the commutator frame used on the commutators of all the arc light machines of improved type manufactured by us, and special attention is called to the fact that this feature of construction embraces novelties which have never before been introduced in connection with this work. First, attention is called to the fact that the entire inside of the thimble is lined with porcelain. The light-colored apertures on the top show a perforation which extends through to the inside of the thimble. One commutator segment is shown in place, which gives a correct idea of its location, besides showing the clear space between the porcelain-lined part of the thimble and the under side of the segment. Nothing but mica is used to insulate the segments from the flanges of the thimble, and this mica is specially prepared in our own factory, great care being used in its selection and a special preparation being used in assembling.



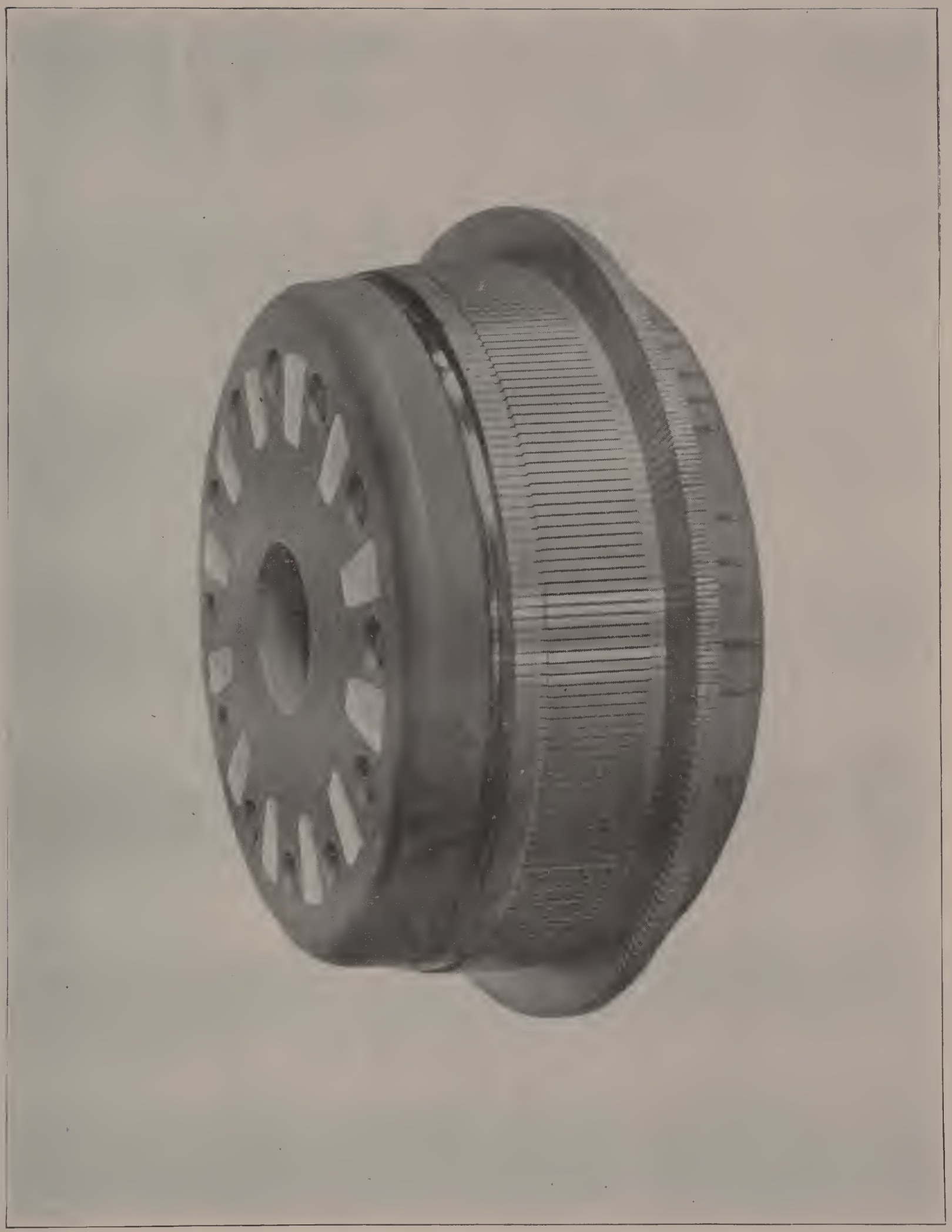
COMMUTATOR FRAME, 100 LIGHT ARC DYNAMO.

PLATE 3

Commutator Complete for Arc Dynamos.

PLATE 4 shows the thimble, as illustrated on the previous page, after having been filled with segments and completed ready for assembling on armature and shaft. A special feature in connection with this Commutator is that an air space is used between the segments in their central portion, or where the brushes make a contact, mica being used at either end to support and insulate them. The open passages on the side admit air currents, which pass to the under side of the commutator bars, and thence out through the open segments, the object being to remove all dust or other deposit that might be otherwise retained on the interior of the commutator.

We also manufacture a closed commutator, of our well-known type of construction, for use in connection with copper brushes.



100 LIGHT ARC COMMUTATOR. COMPLETE.

PLATE 4.

Self-Oiling Journal.

PLATE 5 shows in detail the construction of the Self-Oiling Journal and Bearing, as used in all dynamo electrical machinery manufactured by us. It will be noticed that two oil rings are used for conveying the oil from the reservoir under the journal to the shaft above. The journals are also self-adjusting, being of the universal ball-bearing form of construction, so that the armature shaft has at all times proper adjustment as well as lubrication. The oil gauge, which is introduced for the purpose of always indicating the exact amount of oil in the reservoir, is plainly shown. The glass is protected by a brass sheath, which is open on two sides only. A pet-cock is also attached for drawing off the oil when necessary. The journal cap has two brass plugs which fill holes that are immediately above the oil rings, giving free access for inspection any time while the machine is in operation. It will be noticed that our journals are turned to the arc of the circle corresponding to the diameter of the armature, which makes them self-adjusting in this feature also.

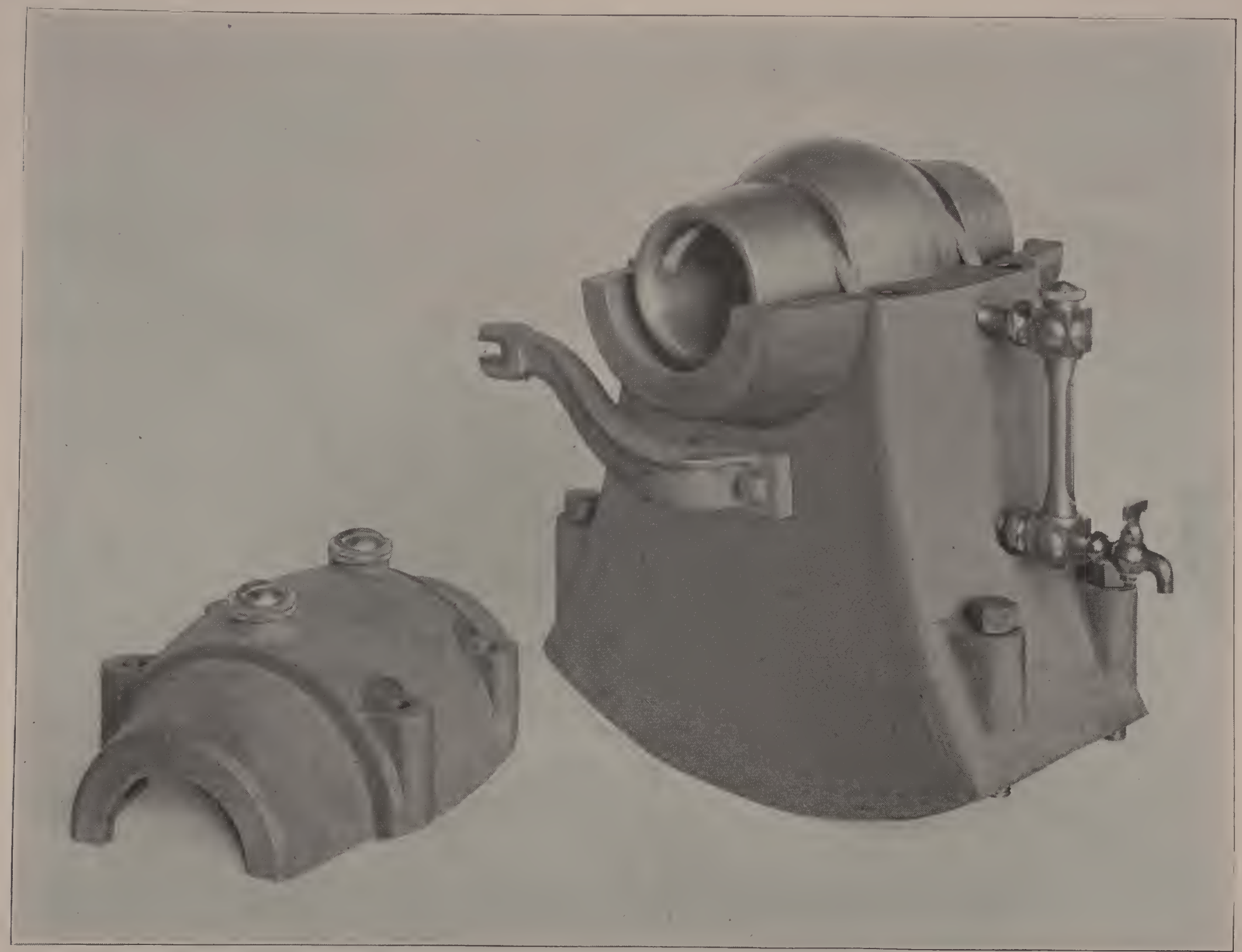


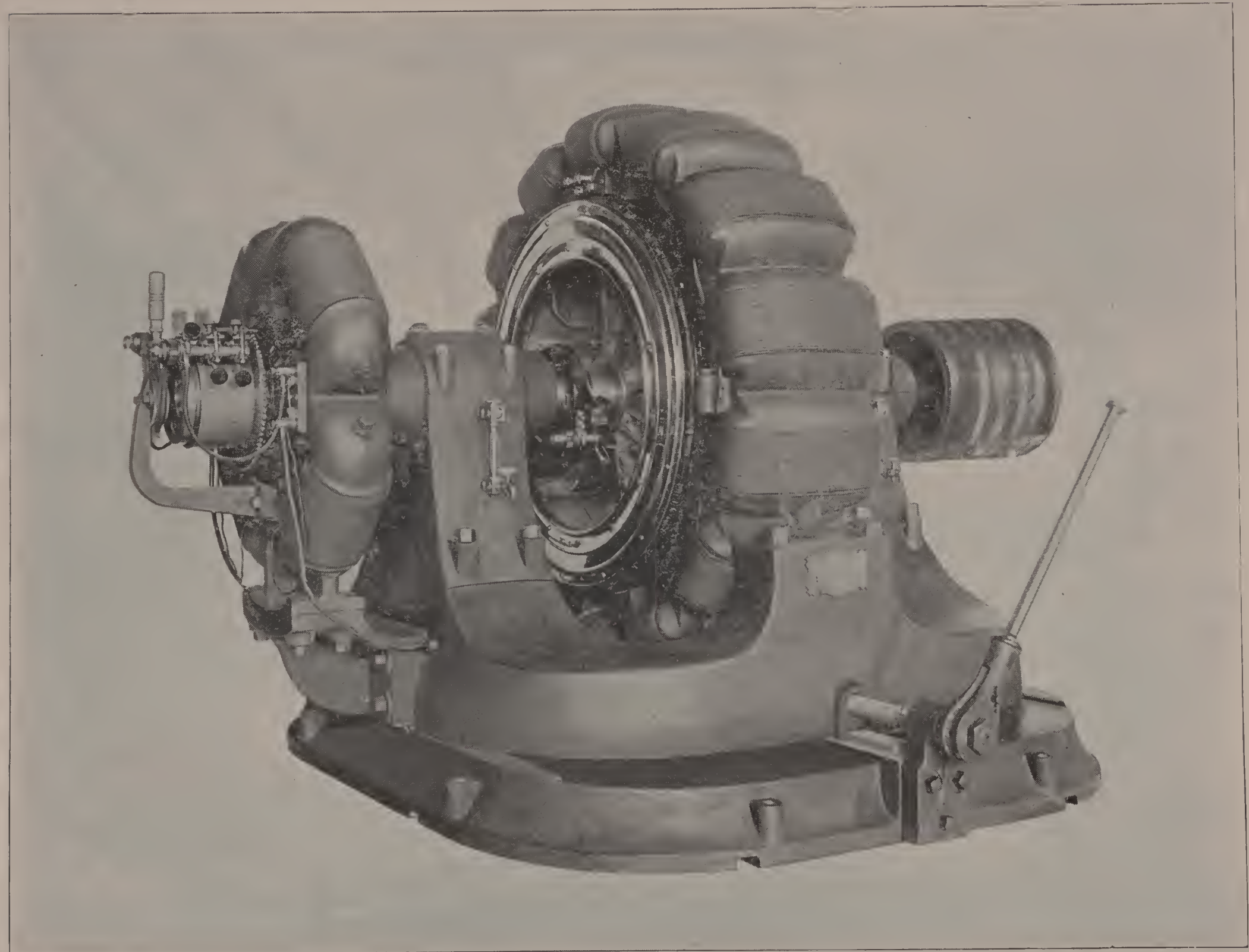
PLATE 5.

DETAILS OF JOURNAL AND PEDESTAL.

Alternating Current Dynamo.

ON pages 21 and 23 are Plates 6 and 8, which illustrate our 65 K. W. alternator and exciter from two different points of view, which, when taken together show all essential details, and permit a ready appreciation of the simplicity and gracefulness of design as an accompaniment to first-class material and workmanship. From the illustrations it will be noticed that the machines are self-contained, the exciter being part of the generator proper, inasmuch as its armature is on the same shaft as the main armature. This, like our other machines, is furnished with a self-oiling bearing of our special design.

The present range of machines extends from 27 to 137 K. W., and upon reference to table of speeds, Plate 40, it will be noticed that the speeds are considerably lower than in other types of alternators for the same output. In addition to this the machines are of a much lighter weight, not exceeding two-thirds of that of other types for the same output. They are wound to generate a maximum voltage of either 1,100 or 2,200 volts. The spherical winding of the fields permits a free ventilation of the armature and at the same time removes the field windings from any inductive influence from the armature. These machines are guaranteed not to heat more than eighty degrees above the surrounding atmosphere on a ten-hour run at 10% overload.



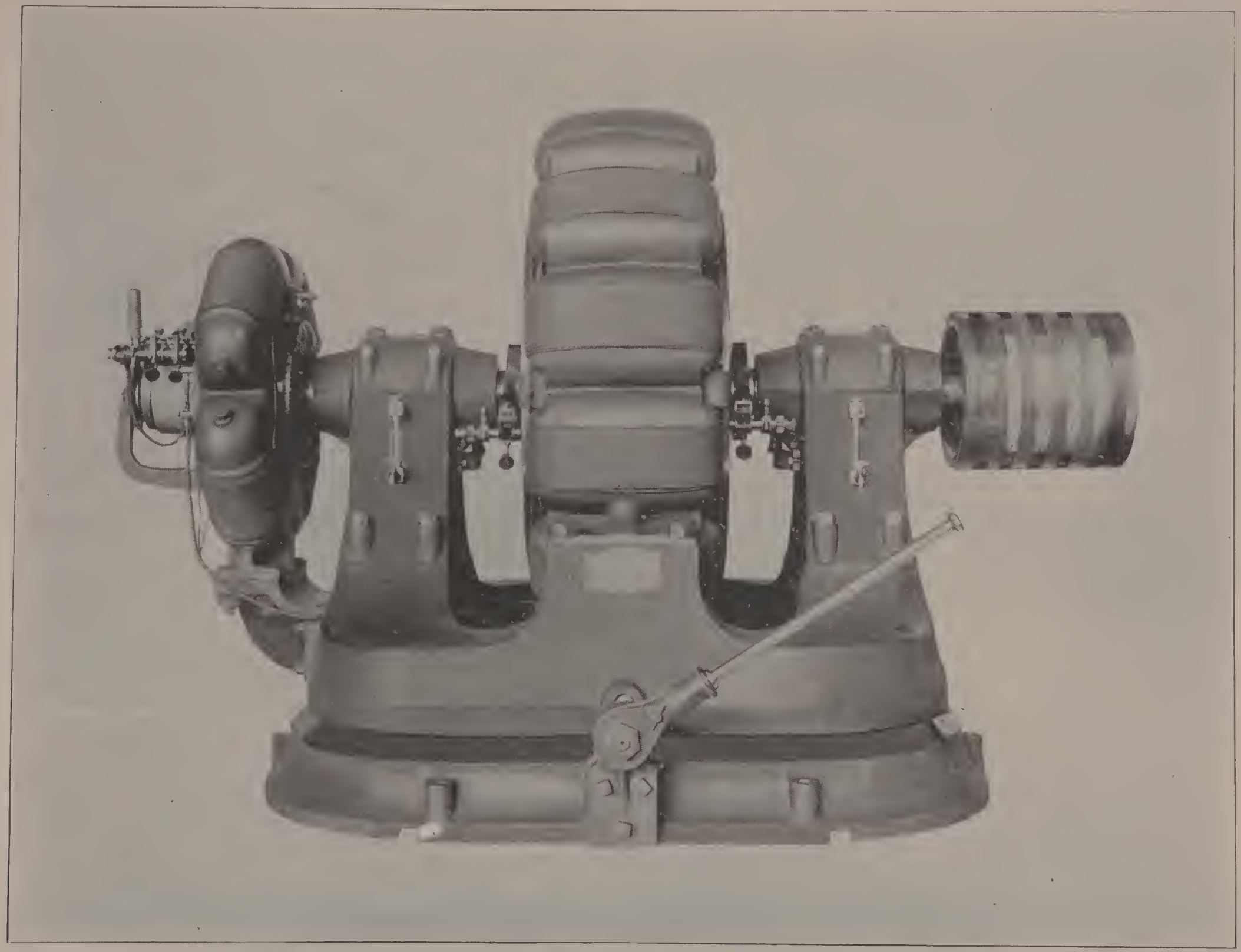
ALTERNATOR AND SELF-CONTAINED EXCITER.

PLATE 6.



CONVERTER CASE AND DETAILS OF FUSING DEVICE.

PLATE 7.



ALTERNATING DYNAMO AND EXCITER (SIDE VIEW).

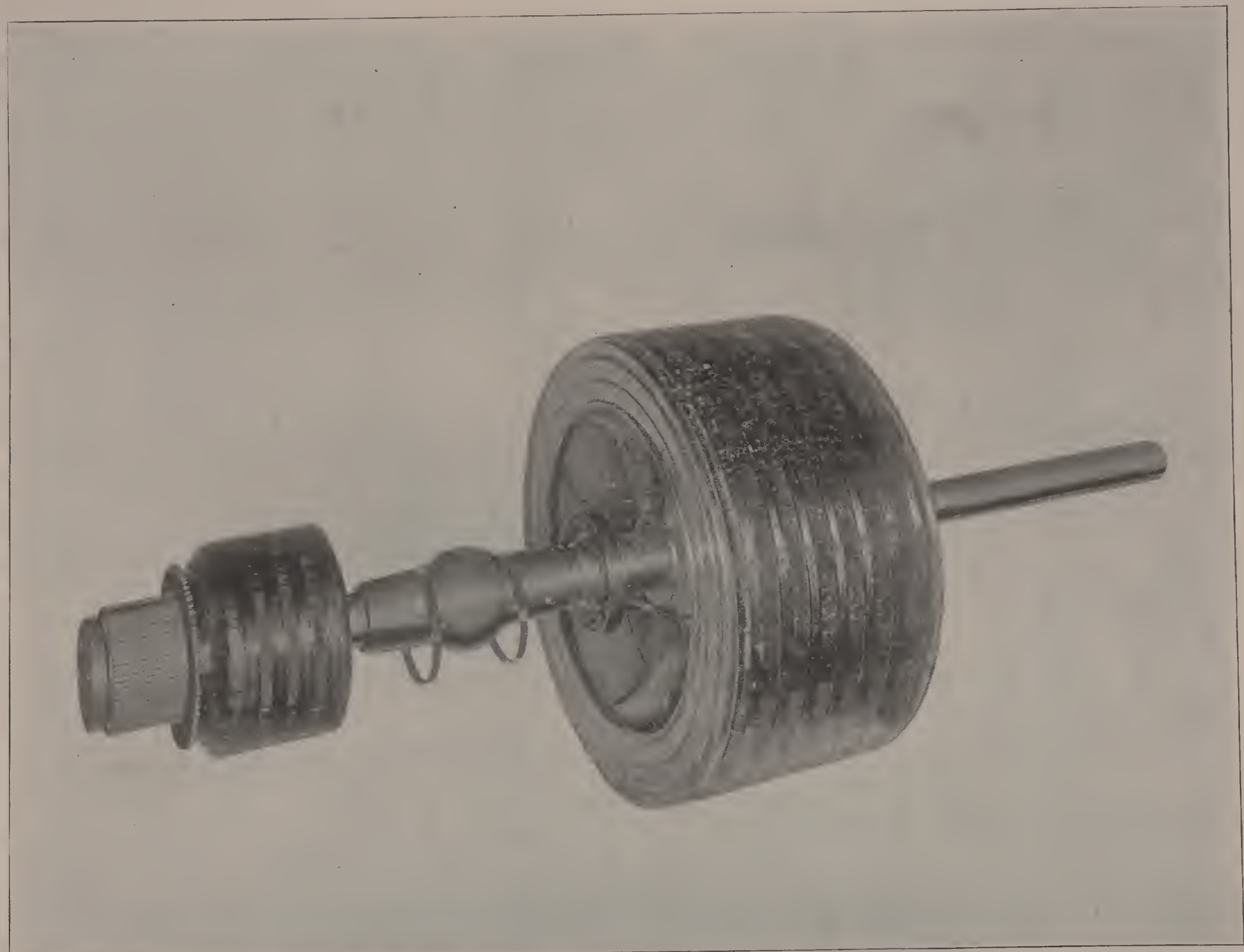
PLATE 8.

Armature for Alternator.

THE Armature built for alternating current dynamos is illustrated in Plate 9. In the smaller alternators, from 27 to 82 K. W. capacity, the exciter armature is mounted upon the main shaft, unless a separate exciter is desired by the purchaser. The illustration shows both armatures mounted upon the same shaft. It also shows the most important journal and its position on the shaft.

When the exciter armature is mounted on the main shaft the exciter commutator is so constructed that the connectors are made fast to the segments by set screws, so that if it is found necessary or desirable to remove the commutator to true it up, by loosening the screws the commutator may be taken from the shaft without disturbing any other portion of the dynamo except the quadrant and quadrant bracket.

The positive and negative collector rings are placed at opposite ends of the armature, so that danger of accidental short-circuit or injury to the attendant is prevented.



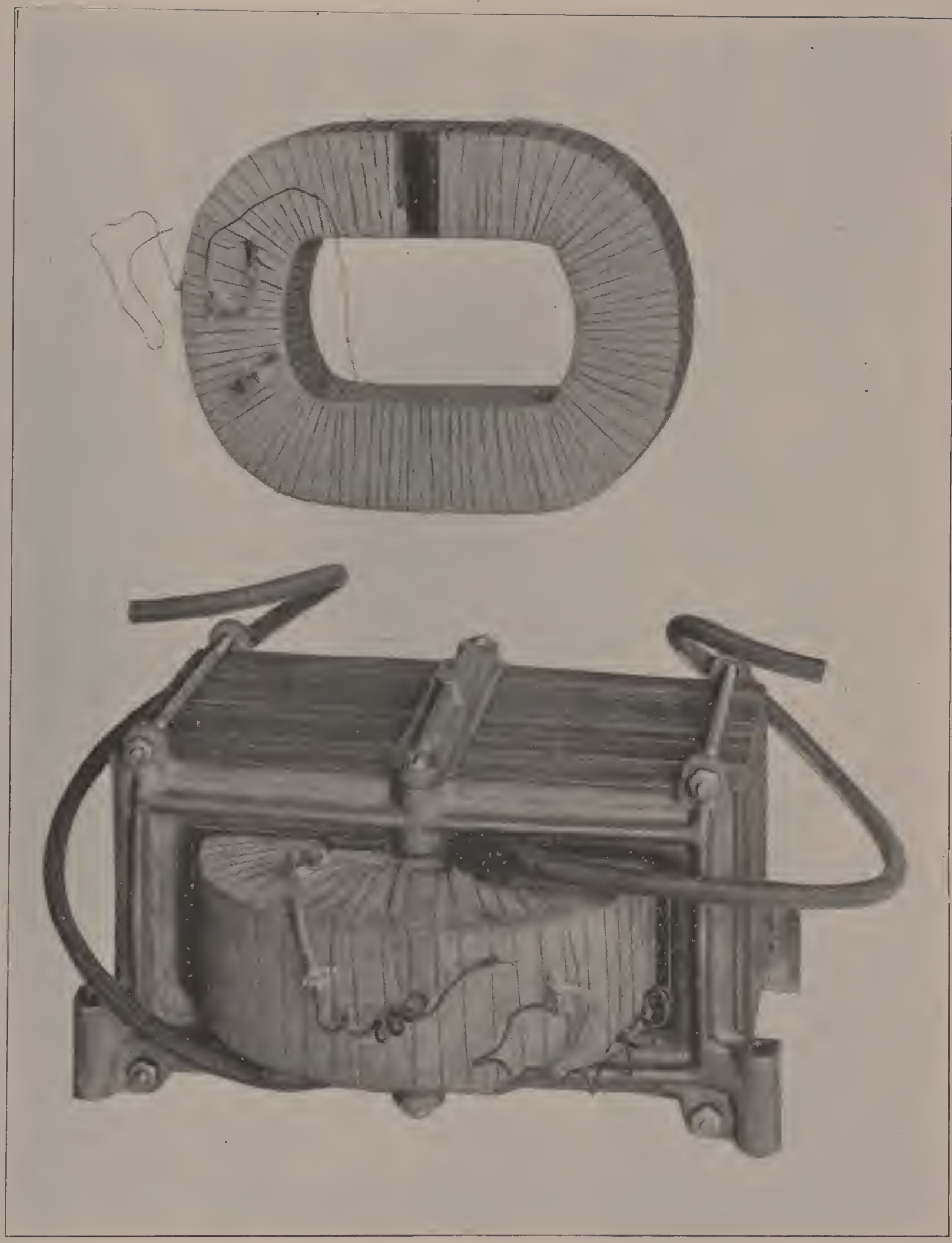
ALTERNATOR ARMATURE, COMPLETE WITH SHAFT AND EXCITER ARMATURE.

PLATE 9.

Converters.

IN the Standard Converters, electrical determinations which have been made for the utilization of the primary and development of the secondary current, skilled workmanship, a rigid inspection during the process of construction, a severe test while under actual load, together with a large factor of safety used in rating their capacity, insures perfect uniformity and the highest degree of efficiency attainable.

The coil is here shown before and after being surrounded with the iron. All sizes and voltages demanded by the market are furnished.



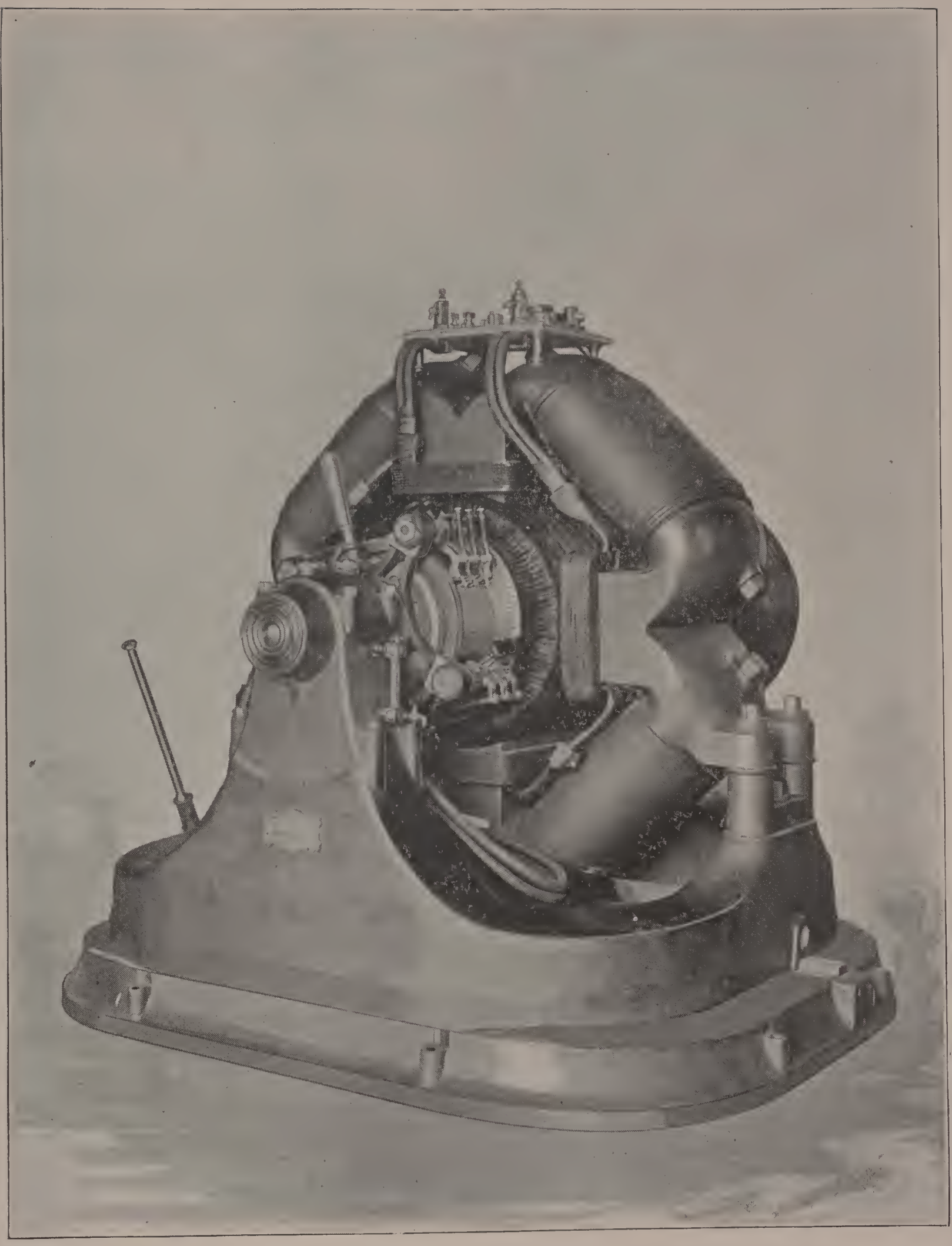
STANDARD CONVERTER, DETAILS OF CONSTRUCTION.

PLATE 10.

Direct Current Multipolar Generator or Motor.

GENERATORS and Motors, of the type shown in Plate 11, are built in sizes from 12 to 225 K. W., 125, 250 or 550 Volts. Upon examination of the general construction it will appear that this generator is, like our arc and alternating current dynamos, of the consequent pole type, having a Gramme ring armature. The fields are magnetically separated or insulated from the base of the machine by a distance piece of non-magnetic metal.

The proportions are so designed and carried out that there is absolutely no sparking at the commutator under any variations of load from zero to 10% overload — and this immunity from sparking is had without any shifting of the brushes on the neutral plane throughout the entire range. Carbon brushes are used on all generators larger than 30 K. W., copper brushes on those of smaller capacity.



DIRECT CURRENT GENERATOR OR MOTOR.

PLATE 11.

Direct Current Armature.

PLATE 12 on opposite page illustrates the armature which is used in connection with our Multipolar Generators. These armatures are wound for all voltages from 110 to 550, as may be demanded by the market. The Gramme winding is used on all sizes up to and including the 130 K. W. The larger types contemplated now are to be made with ring armature having drum winding cross connected at the ends.

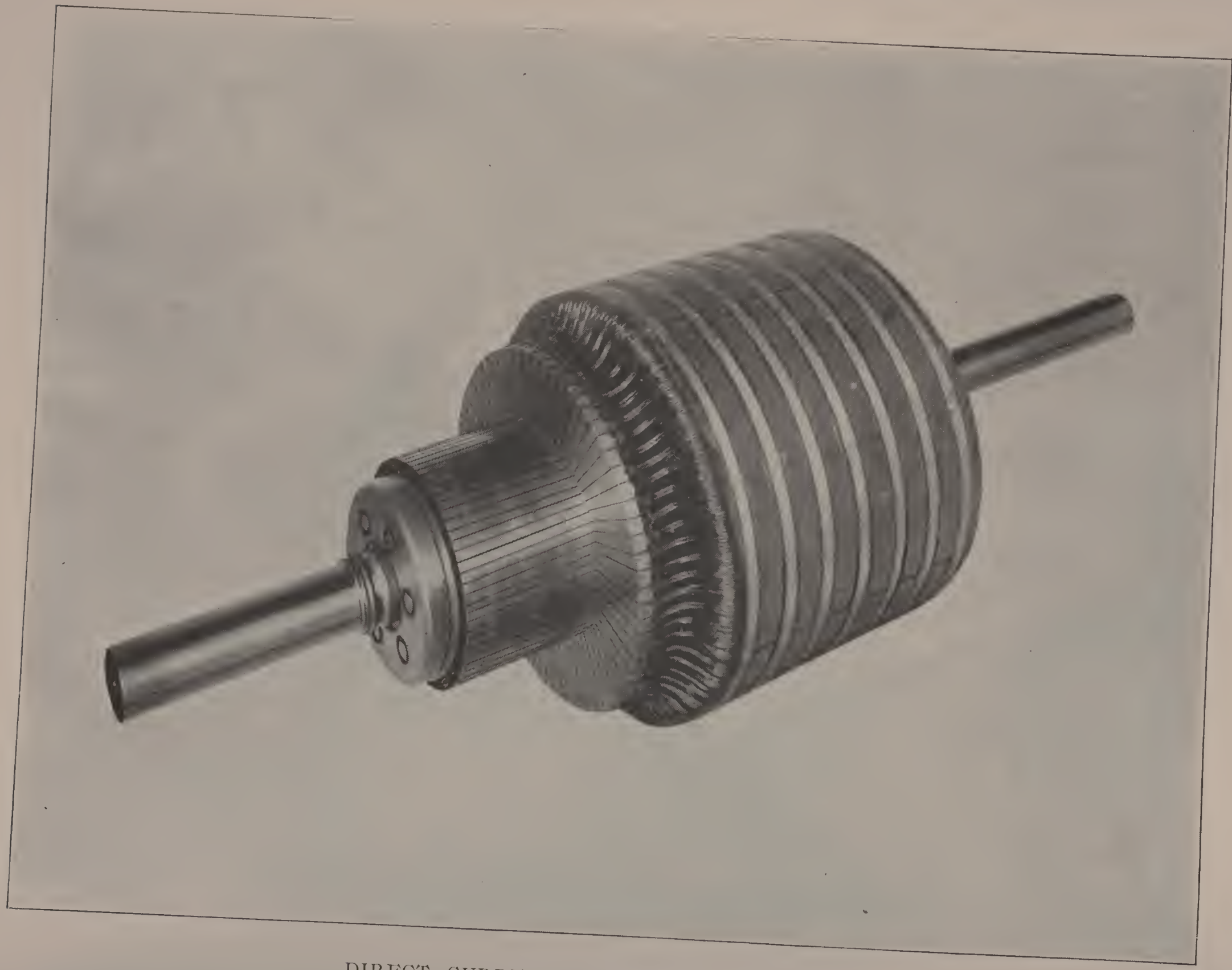


PLATE 12. DIRECT CURRENT ARMATURE, COMPLETE.

Direct Current Commutator.

OUR direct current commutators have received special care in their construction, and after some considerable experiment we have produced a commutator which is practically non-destructible and invariable in its perfect operation. All commutators manufactured by this Company are put together under a temperature of about 800 degrees and after they are finished will never become loose or out of shape, as has been the case with commutators of earlier methods of construction. Great solidity and the use of the very best material and workmanship, insures for these commutators a greater life than that attained by any commutator that has heretofore been introduced.



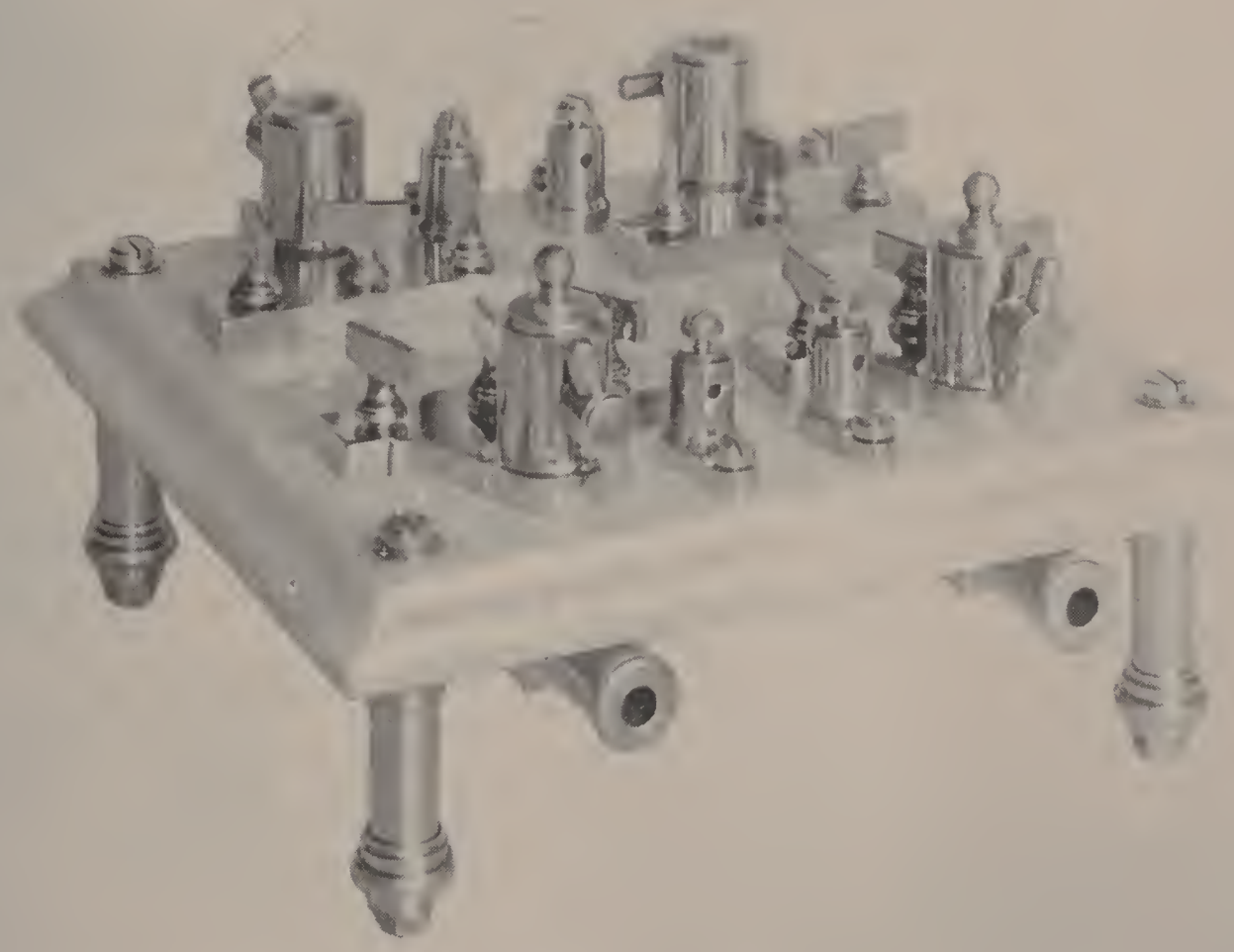
DIRECT CURRENT COMMUTATOR.

PLATE 13.

Terminal Boards.

TERMINAL Boards of white marble are used on our dynamos. The small upper board, Plate 14, contains the terminals and improved dynamo switch for our series arc dynamo which is fully described elsewhere. The large board is used on our multipolar generators and on this all the shunt and series connections are made. Both poles are here fused for additional protection. The metal terminals are of highly finished red metal and are conveniently and firmly placed.





DYNAMO TERMINAL BOARDS, ARC AND D. C.

PLATE 14.

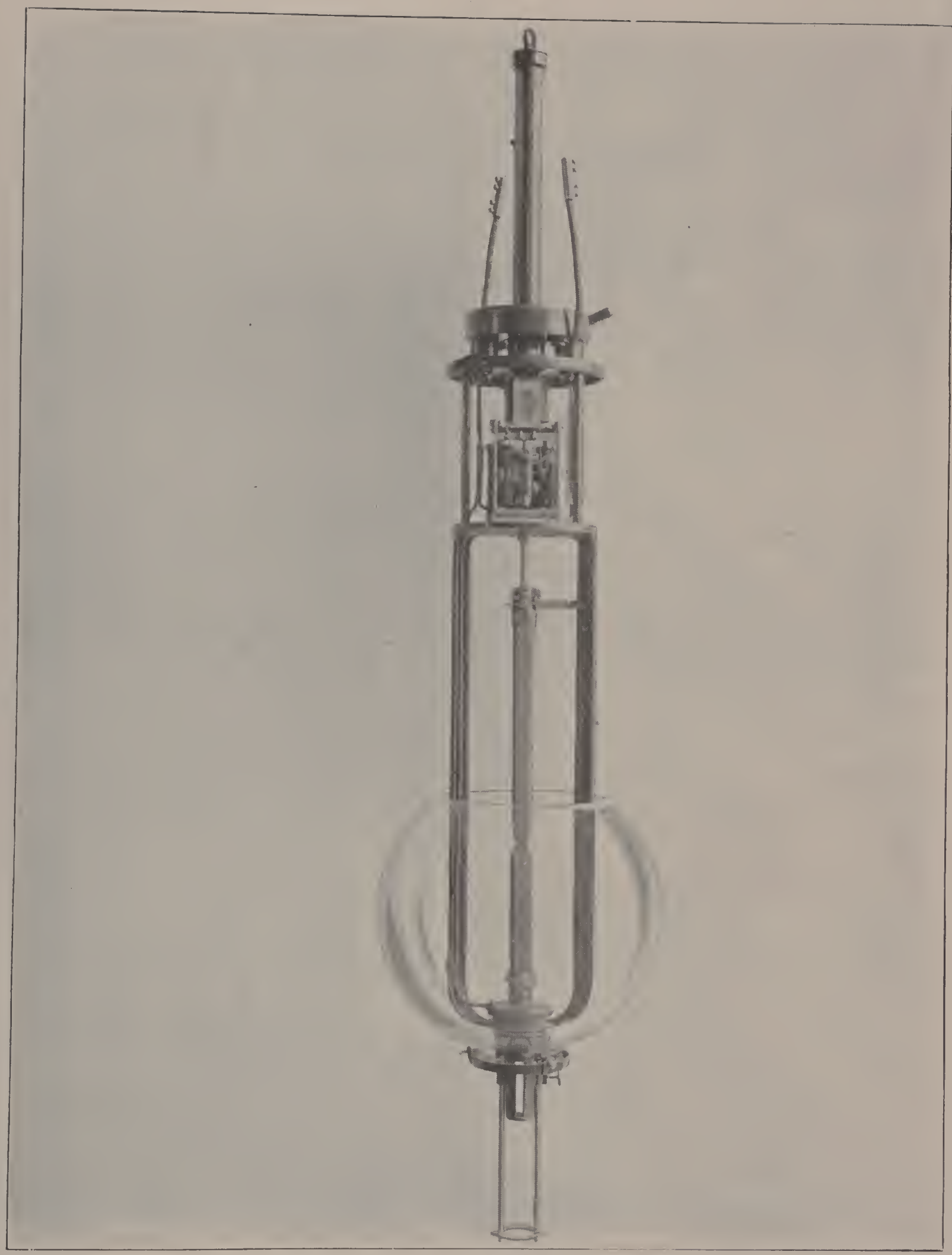
The Standard Arc Lamp.

SEVERAL years of successful operation is the record which has been made by the series arc lamps of different patterns manufactured by this Company. This lamp has been used under every condition of service and has invariably proven reliable and economical in respect to repairs and renewals.

This Company was the first to introduce the feature of all-night lighting by means of a single lamp mechanism, one carbon rod and a single pair of carbons. The simplicity, economy and desirability of such a lamp is now universally acknowledged by electrical engineers and operators.

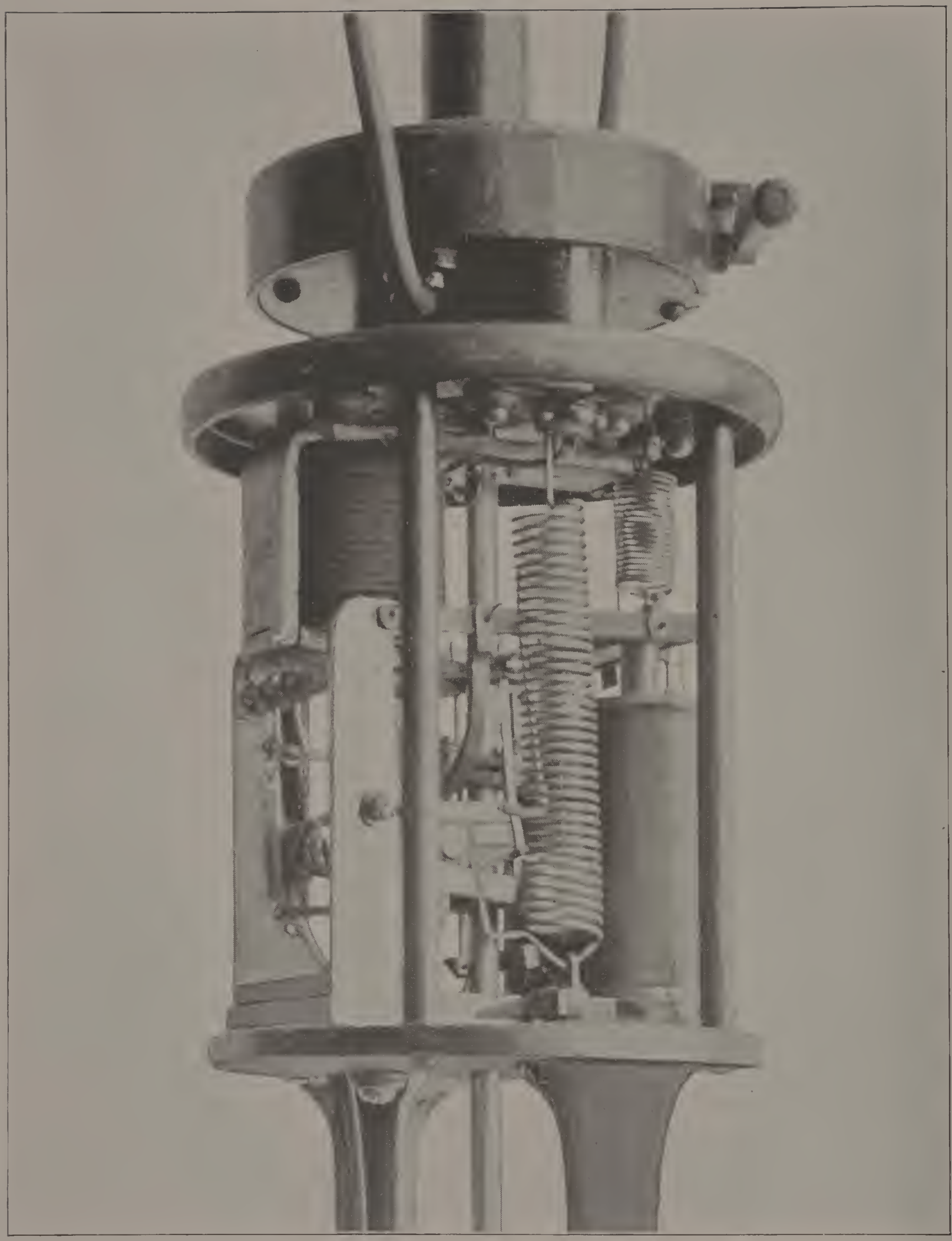
The elliptical carbon, as designed and used in the Standard double service arc lamp, is the only practical solution of the simplified double service all-night lighting problem.

Several different types of arc lamps are herein illustrated, and others of different types and characteristics and for different purposes are manufactured by this Company. The Standard lamps may be furnished for any volume of current, from five to fifteen amperes. Ornamental lamps of special design are furnished when desired.



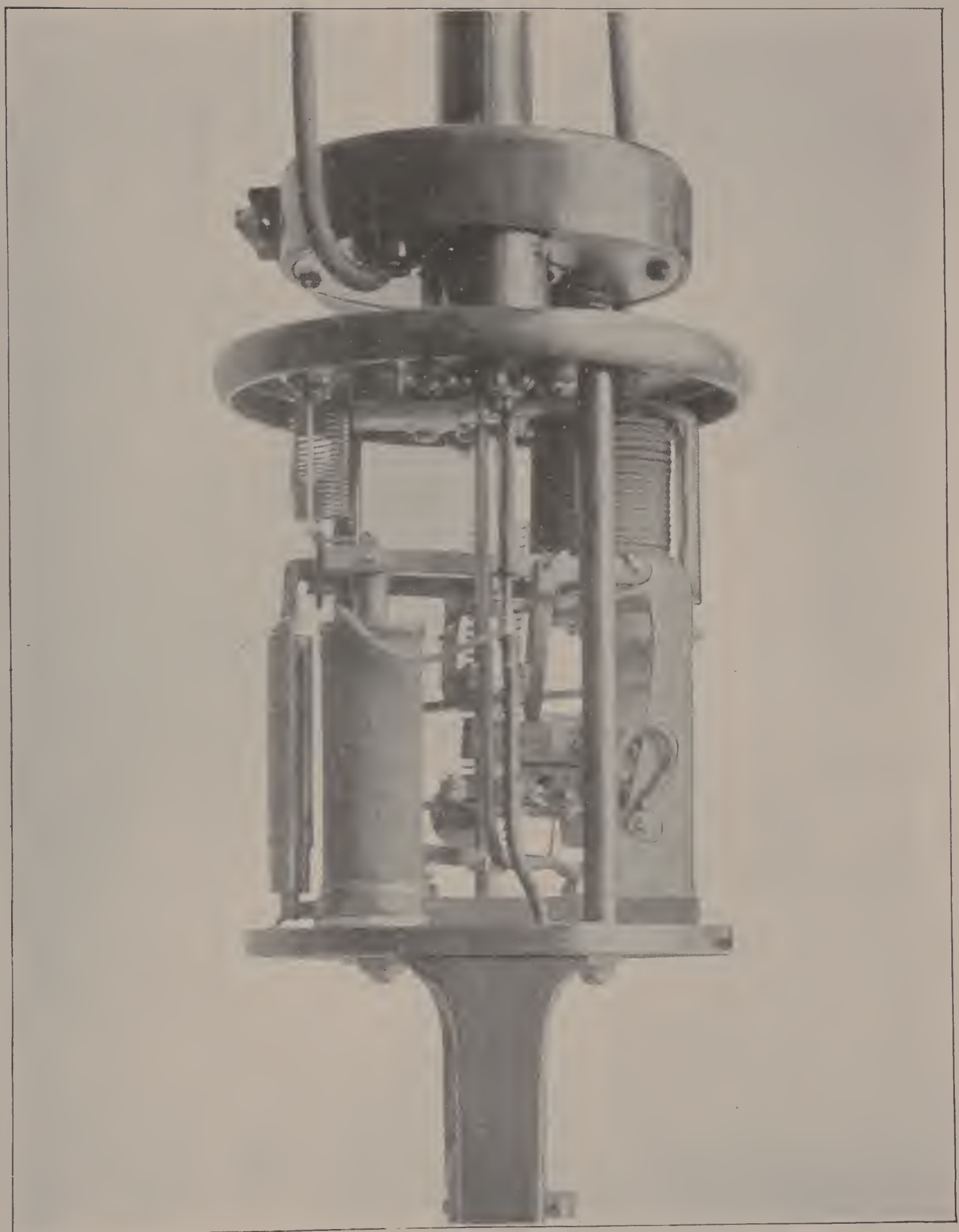
DOUBLE SERVICE ELLIPTICAL CARBON LAMP.

PLATE 15.



INTERIOR VIEW D. S. ARC LAMP.

PLATE 16.

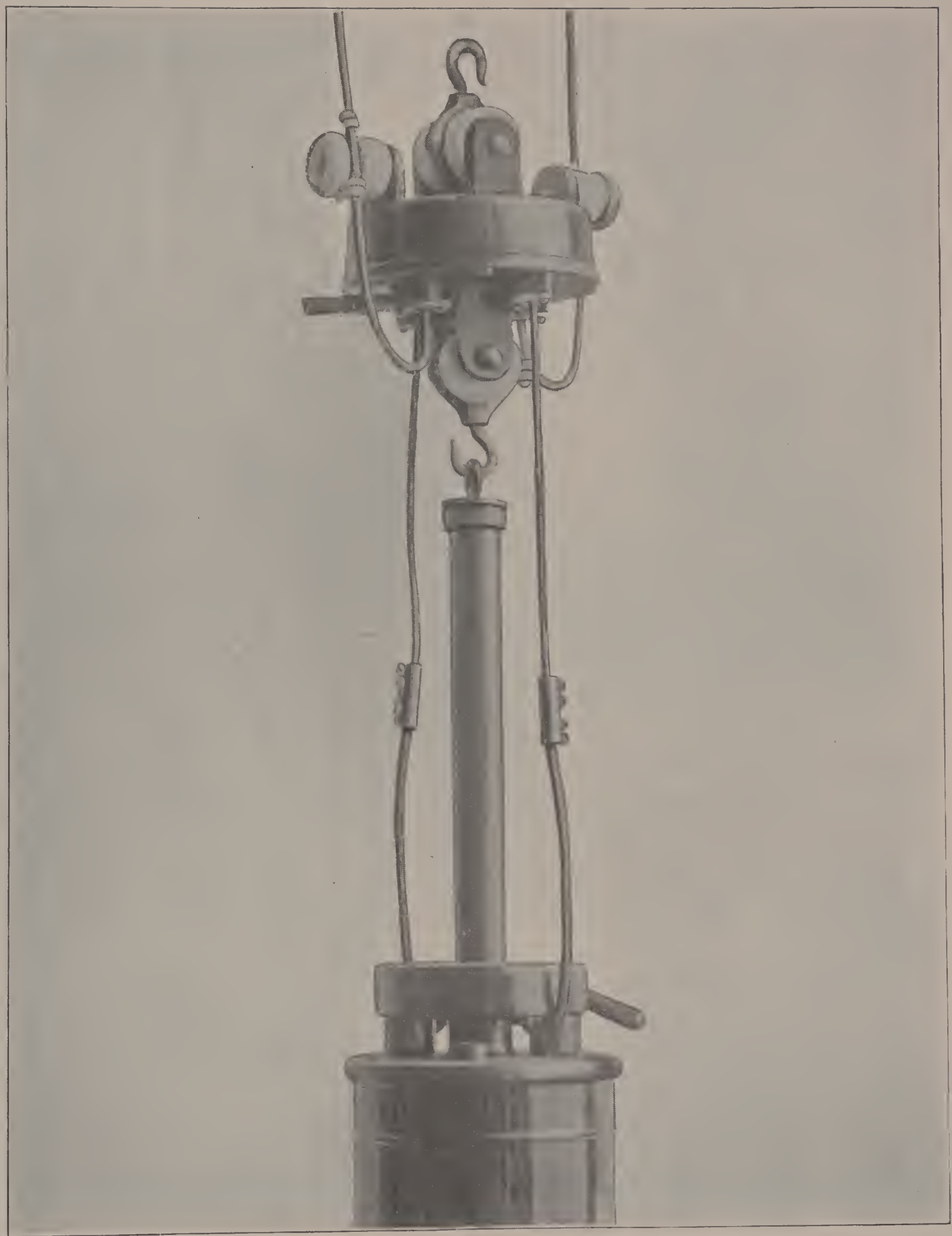


INTERIOR VIEW D. S. LAMP.

PLATE 17.

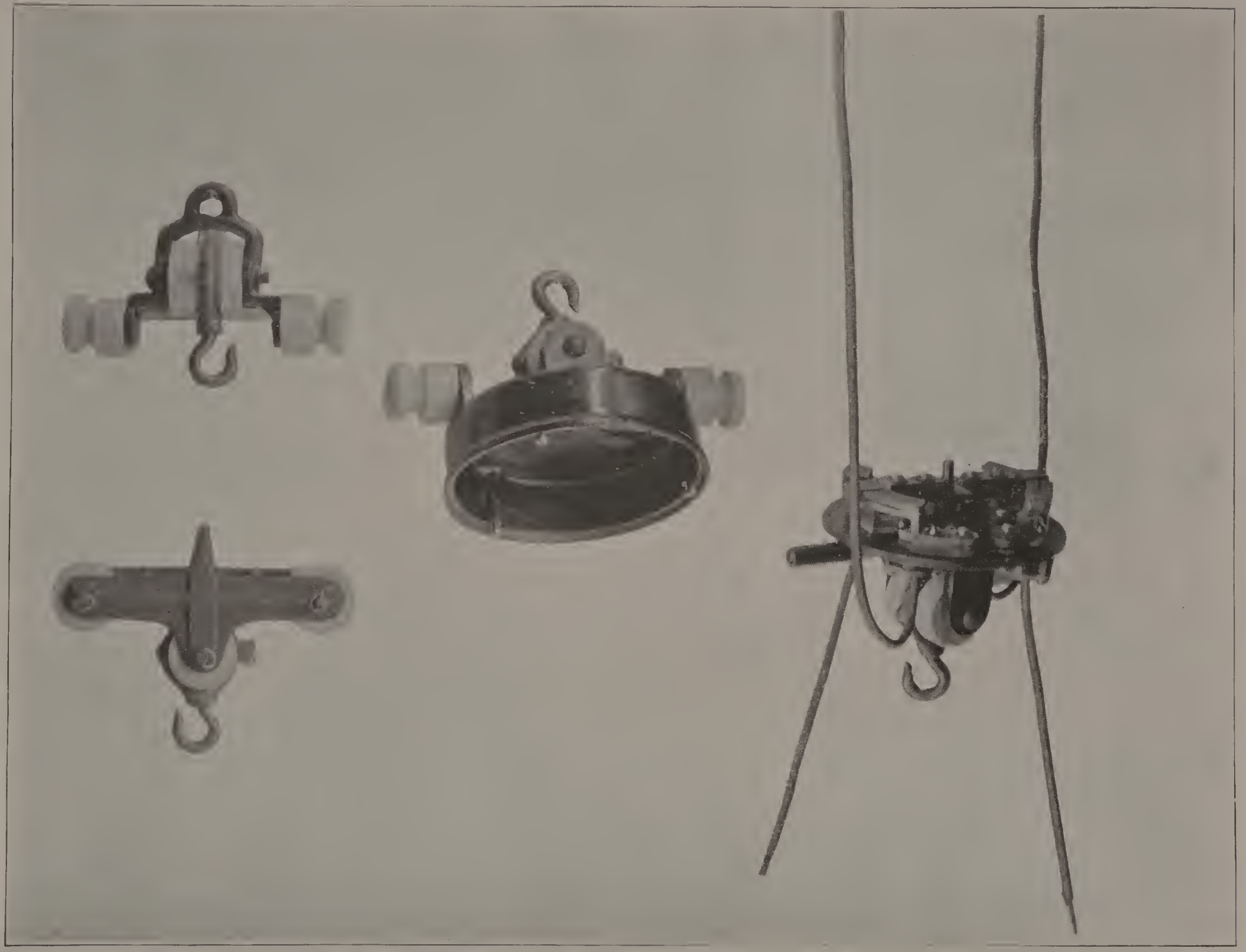
D. P. Weatherproof Arc Lamp Hanger and Switch.

IN construction and operation the Switch in this device is similar to the "Acorn" switch described elsewhere. The four terminals of this device are each provided with a stuffing box, thereby rendering the case air-tight and waterproof. By the proper use of swivel hooks and glass insulators, grounds on the switch box and lamp frame are impossible.



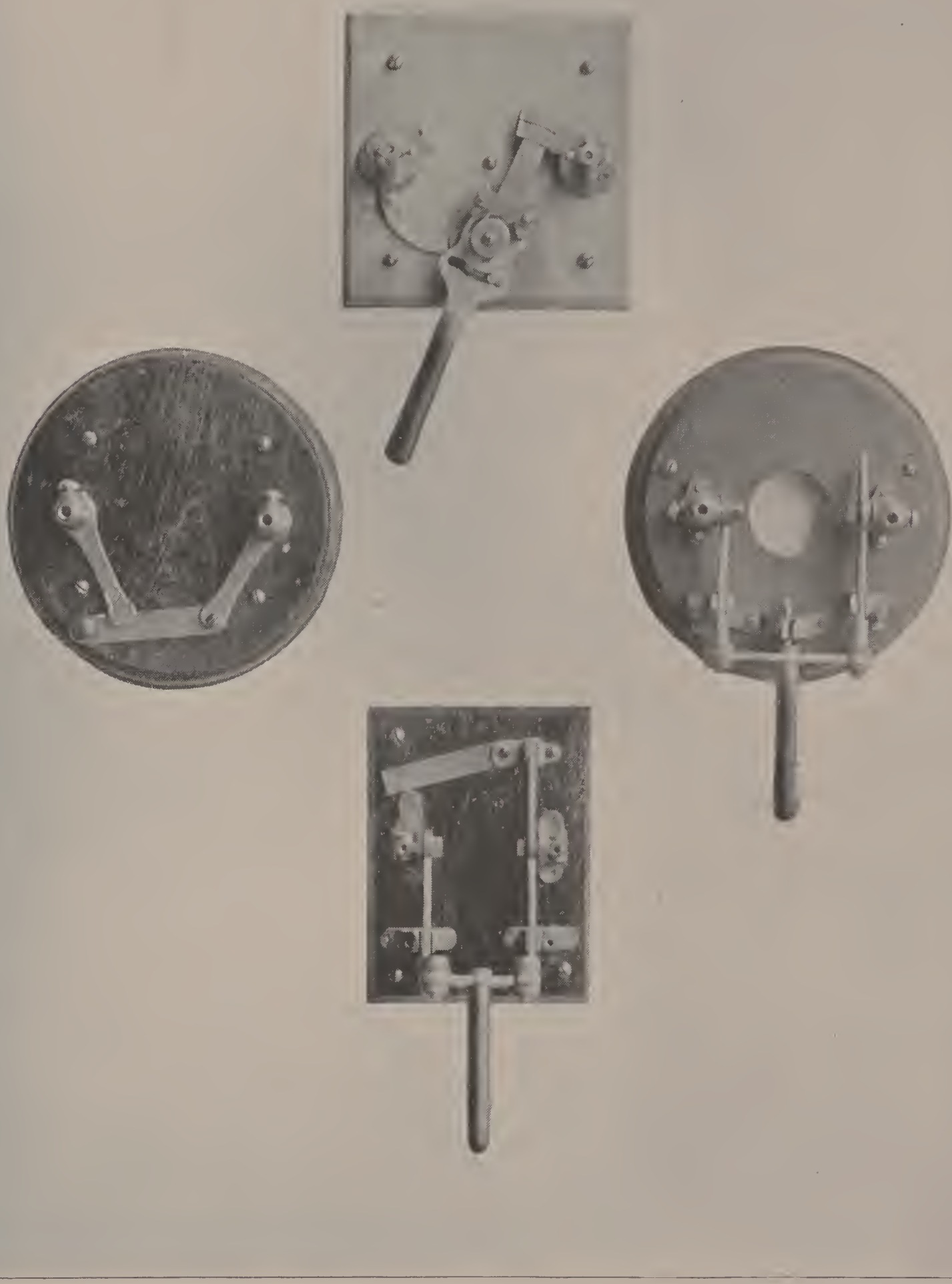
D. P. WEATHERPROOF ARC LAMP HANGER AND SWITCH.

PLATE 18.



INSULATED ARC LAMP HANGERS AND DETAILS OF W. P. HANGER SWITCH.

PLATE 19.



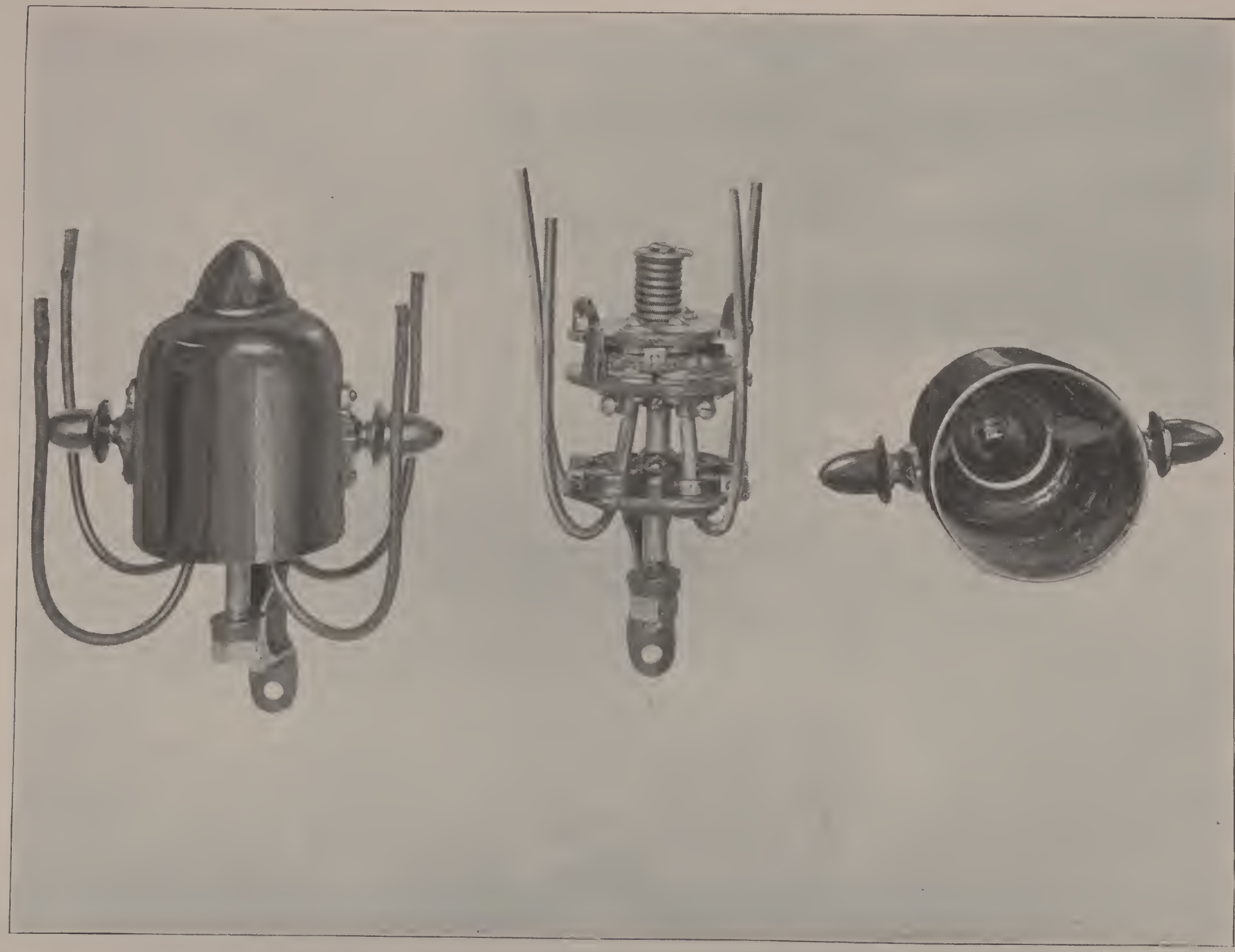
CEILING BOARDS AND CUT-OUTS.

PLATE 20.

"Acorn" D. P. Arc Cut-out.

THIS Switch, as made weatherproof for pole work or use on the exterior of buildings, is fully illustrated in Plate 21. It is made with sliding contacts, each contact resting upon its own fulcrum, thereby equalizing the pressure of the single spring and thus securing perfect contact. On account of the peculiar construction of the switch, rough usage can never jar the insulation loose or break it, a common fault with switches for this purpose.

The Cut-out in its operation makes contact before it breaks, therefore it is of the low potential type and can only be used to cut out or in from one to ten arc lamps without sparking. It is made in a different case for inside use.

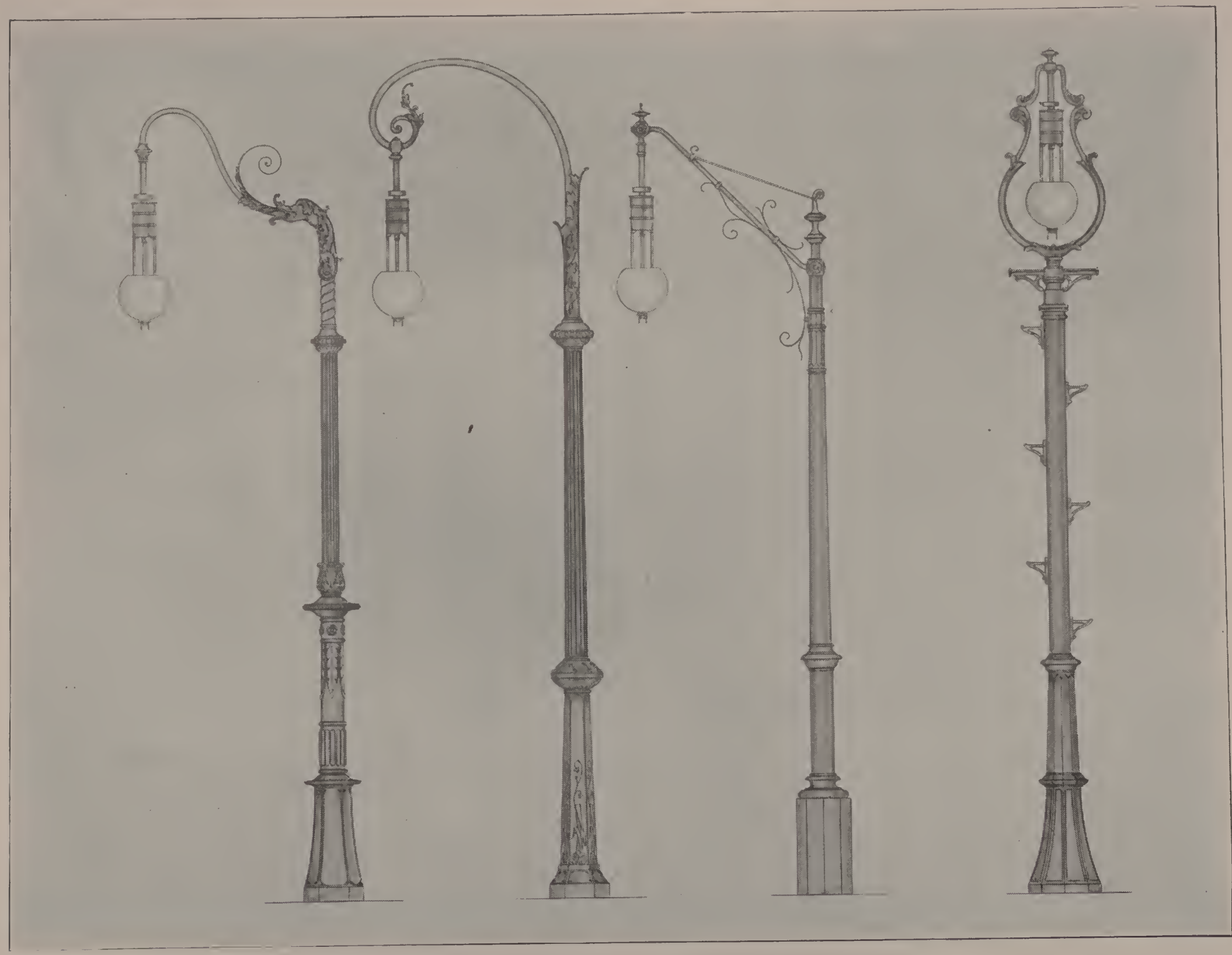


"ACORN" D. P. ARC CUT-OUT, WEATHERPROOF.

PLATE 21.

Lamp Posts.

A NEW line of iron poles designed especially to meet a demand long felt for ornamental poles adapted to either Boulevard or Avenue work or for general street lighting, are here illustrated. The poles, as designed, all have interchangeable tops, enabling a combination to be made of such bases and tops as may be most desirable for the work in view. They are so arranged that they can be furnished in either 16, 20 or 24 foot lengths. The head of the corner pole is made separable so that it can be used on ordinary wooden poles, and is furnished by us with either wooden or iron center columns, as may be desired.



ORNAMENTAL IRON ARC LAMP POSTS.

PLATE 22.

The Standard Voltmeter.

THIS instrument is, as its name signifies, *standard* not only for our system but may be used as such for any other system. After a long series of experiments we claim to now be in possession of a commercial instrument for electrical work which is superior in every respect to anything which has heretofore been produced. It is guaranteed to be accurate within 1½%, absolutely permanent in its calibration and to have no change due to heating effect. We do not use one instrument for a check on an entire plant, but each voltmeter is a completed and scaled voltmeter and can be used not only for work which may be a regular thing in the plant, but can be relied upon for measuring potentials within its range for any purpose whatever.

The voltmeter represented is used for both alternating and direct current work, but the instrument scaled for direct current is not the exact scale for alternating current, or vice versa, but the same form of instrument is used for any kind of work calling for measurement of potential. If during transportation, or by carelessness in handling, the voltmeter should by any means become out of adjustment, the small index pointer, which is more clearly shown in the ammeter on the next page, is for the purpose of adjusting the pointer of the standard instrument, the action being simply to move it one way or the other as the regulator of a watch is moved. Once the instrument is adjusted by this means in any part of the scale, it is then correct throughout the entire scale.

These instruments are calibrated for a periodicity of 125 per second, but can be adjusted for any other standard by means provided as above mentioned.



STANDARD VOLTMETER, ALTERNATING OR DIRECT CURRENT.

PLATE 23.

Ammeter.

THE Ammeter represented by Plate 24 is exactly the same in mechanical construction in its moving system as the voltmeter, and has identically the same features. This instrument is used in our alternating, direct current, constant potential and series arc lighting work, and is made in this form up to 150 amperes capacity.



AMMETER, ALTERNATING OR DIRECT CURRENT.

PLATE 24.

Large Ammeter.

THE Ammeter represented by Plate 25 is the same in its moving system as the two preceding instruments, and is made for use on heavy currents from 250 to 1,500 amperes. In every respect we believe that it is the most satisfactory instrument for measuring heavy currents that has ever been offered in the American market.



DIRECT CURRENT AMMETER, 500 AMP.

PLATE 25.

Ground Detector.

ON the opposite page Plate 26 represents an instrument which has long been looked for by the trade, viz: A Ground Detector that is as much an instrument for this purpose as, relatively speaking, an amperemeter and voltmeter are for their respective purposes. By means of this Ground Detector not only is the fact of the ground on the wire discovered, but the wire on which it exists is pointed out and approximately a correct indication given as to the resistance of the ground by a deflection of the needle over a scale, thus enabling an engineer to tell whether it is safe to keep a grounded circuit in operation or not. By the use of a compound switch this instrument may be used for any number of circuits.

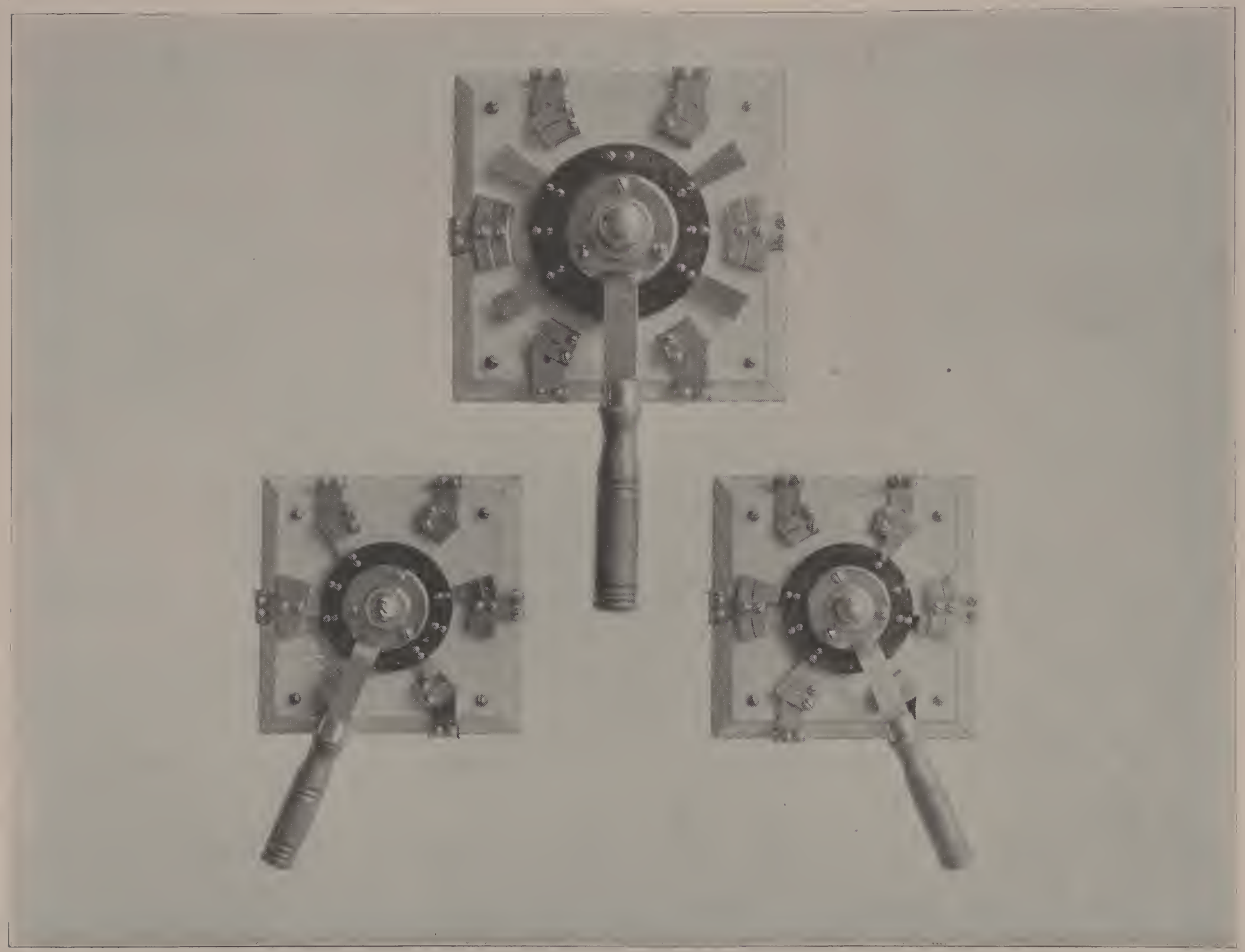


GROUND DETECTOR.

PLATE 26.

High Potential Alternating Switches.

PLATE 27 on the opposite page is a perfect reproduction from switches manufactured by us for alternating or high potential work. The three different positions of the switch are shown. The special object of such a switch is to transfer a circuit from one dynamo to another while the dynamo or dynamos might be in operation. It will be noticed that during a transfer of circuit four distinct breaks are made, and that no current from either circuit or dynamo is retained in the blades of the switch during the transfer. A potential of 5,000 volts can be broken with these switches without any perceptible arcing, and it is not necessary to use undue haste or force to accomplish this end, as the current may be broken with as much deliberation as may be found convenient; understanding, of course, that in transferring a live circuit it is not desirable to put the lights out, and to avoid this is one of the features of the switch, it having a rotary motion of extremely short travel. The object can be accomplished with scarcely a perceptible waver in the light. Attention is also called to the fact, that as this is a knife switch, all contacts are perfect and are always kept bright and clean by their action. At present these switches are made in three sizes: 30, 65 and 125 amperes capacity.

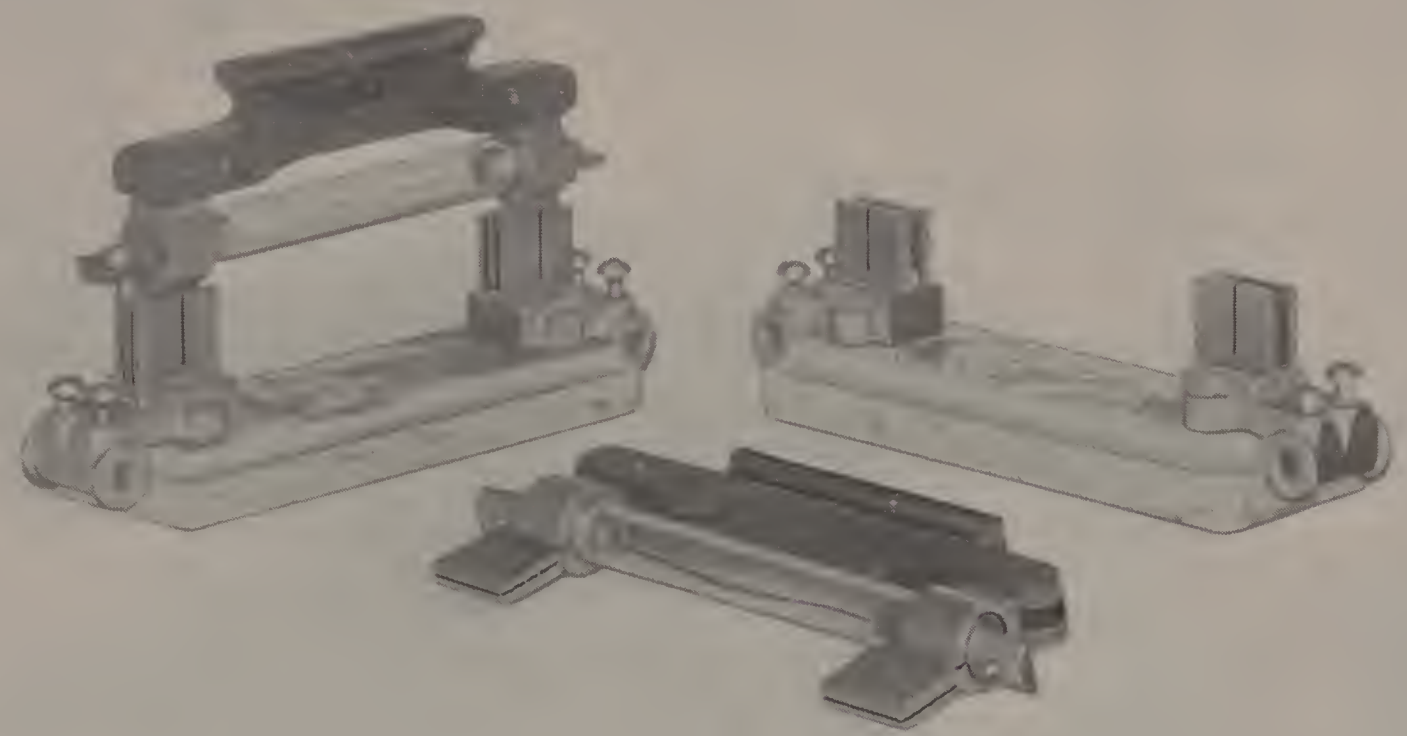


HIGH POTENTIAL ALTERNATING CURRENT CIRCUIT CHANGING SWITCHES.

PLATE 27.

High Potential Fuse Terminals.

OUR High Potential Fuse Terminals, which are a special feature in connection with our alternating current system, are shown in Plate 28. The main advantages of the device are, first — that the fuse is detachable from the circuit, enabling the operator to provide a new fuse wire when detached and reinsert it while the current is flowing through the line; second — the fuse is surrounded by a glass tube, which prevents any arc from forming between the terminals when a sufficient excess of current flows to cause a fusing, by reason of a sufficient pressure being formed by the vaporizing of the fuse to expel the arc from the glass tube which surrounds the fuse wire. Hard rubber tubing can be used in this device if preferred to glass.

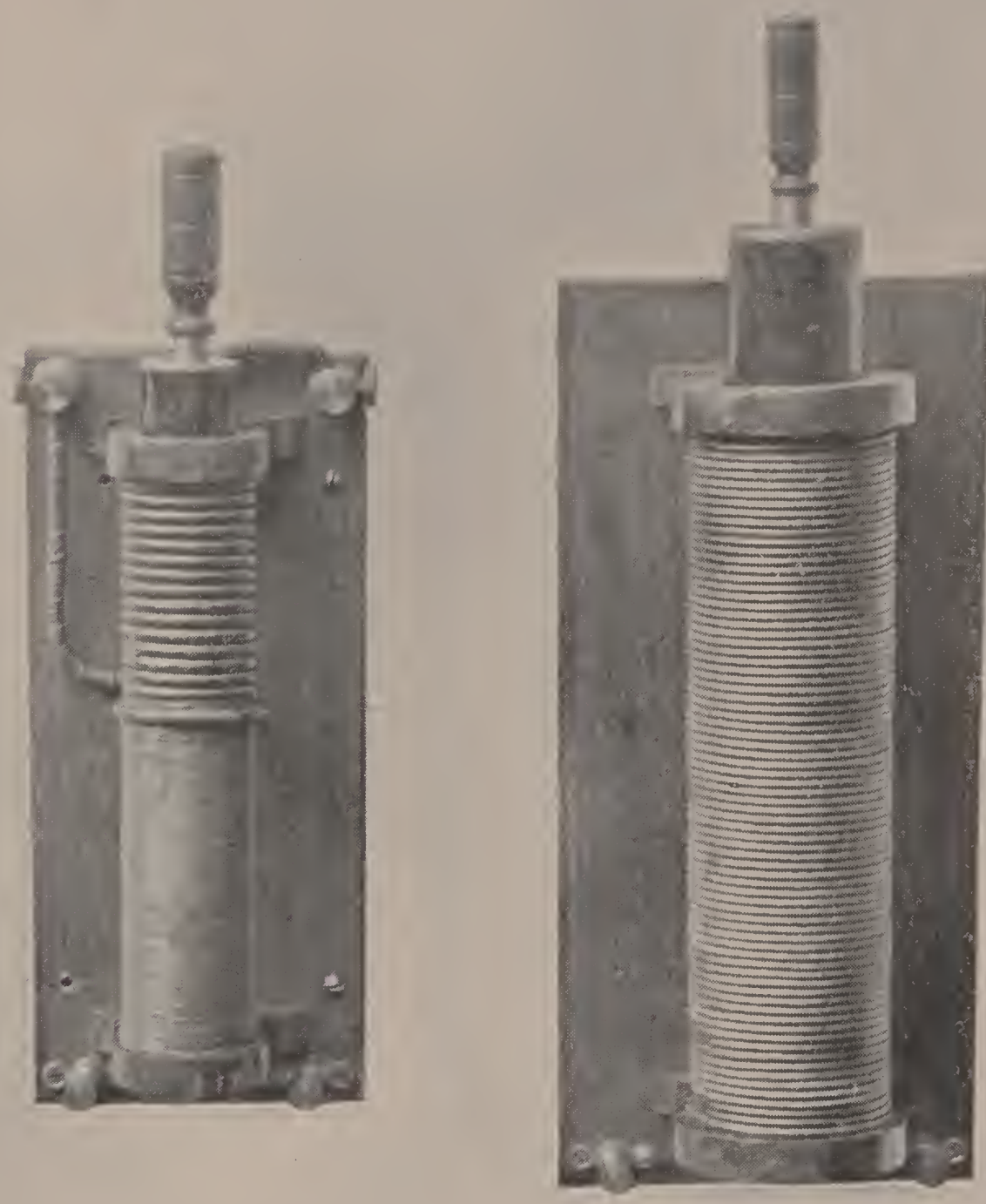


HIGH POTENTIAL MAIN LINE FUSE TERMINALS.

PLATE 28

Dimmers.

PLATE 30 on opposite page represents the appliances made by us for stage regulators, or dimmers for controlling alternating currents for any purpose whatever. They are made to be used on primary or secondary voltages and for any amperage that may be demanded by the market.



ALTERNATING CURRENT STAGE DIMMERS.

PLATE 30.

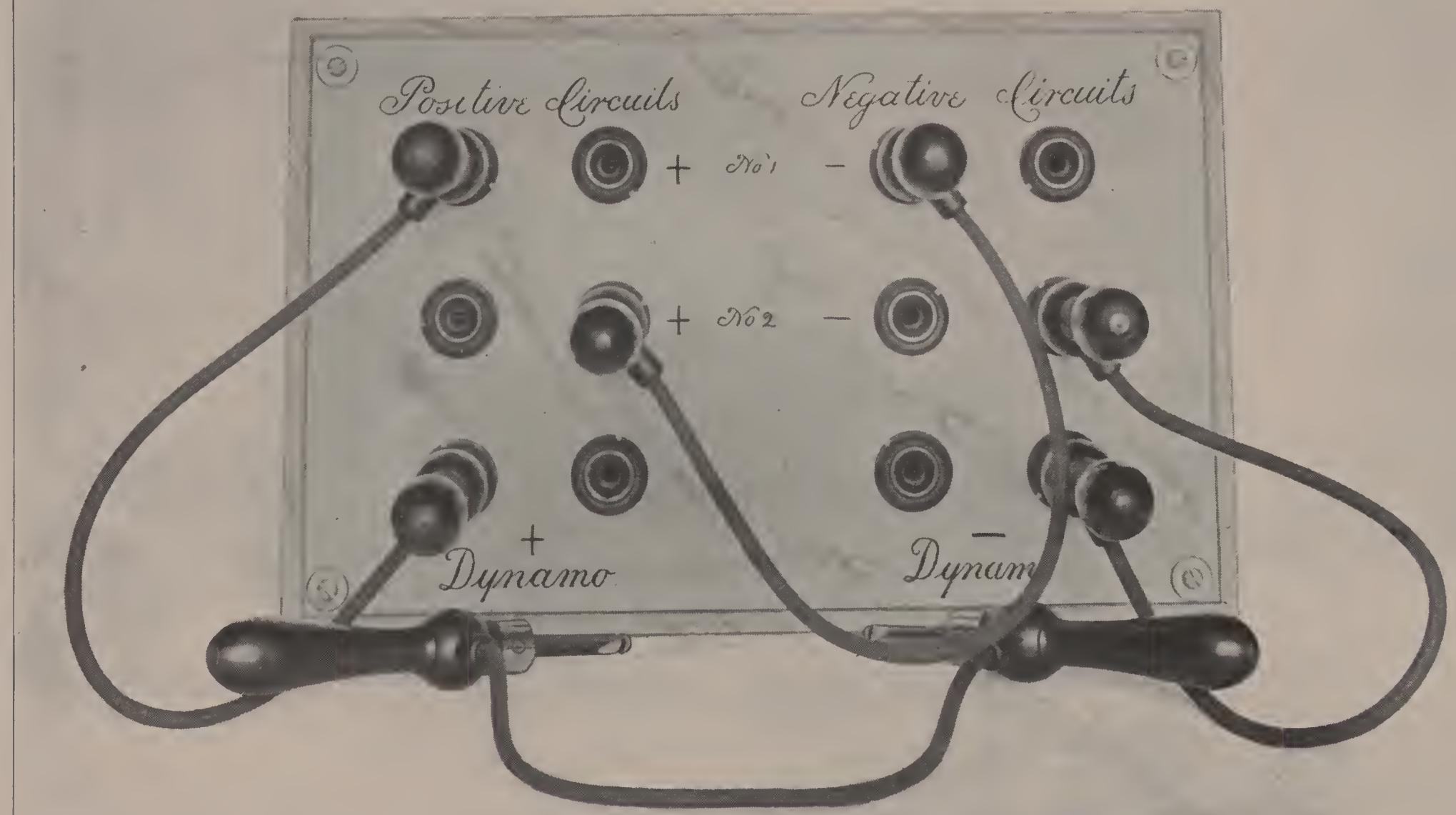
General Switchboard Work.

THE following illustrations of our Switchboards for different purposes fully and clearly illustrate the general requirements of station work; and we would say, in connection herewith, that all of our instruments and accessories, such as switches, etc., are mounted on white marble sub-bases. If it is desired to again remount these on a background of white marble or slate, we do so, or a skeleton board made of wood is furnished. To avoid objections to wood, however, is the chief object in mounting the instruments and accessories as we do. Of course, any arrangement not shown in the following illustrations of switchboards are always considered and carried out when necessary, as it would be impossible to illustrate every combination that might be required, for local conditions are not always adaptable to one standard.

Combination Plug Switchboard.

FOR small and medium stations, combination Plug Switchboards, having capacities from one dynamo and two circuits to six dynamos and seven circuits, are kept in stock. These boards are built of white marble, polished, and equipped with sockets, plugs and loops for the dynamos and circuits provided for. The arrangement of the positive and negative sockets and bus-bars is very simple and compact.

For large stations or special work, switchboards are designed and made to meet the requirements.

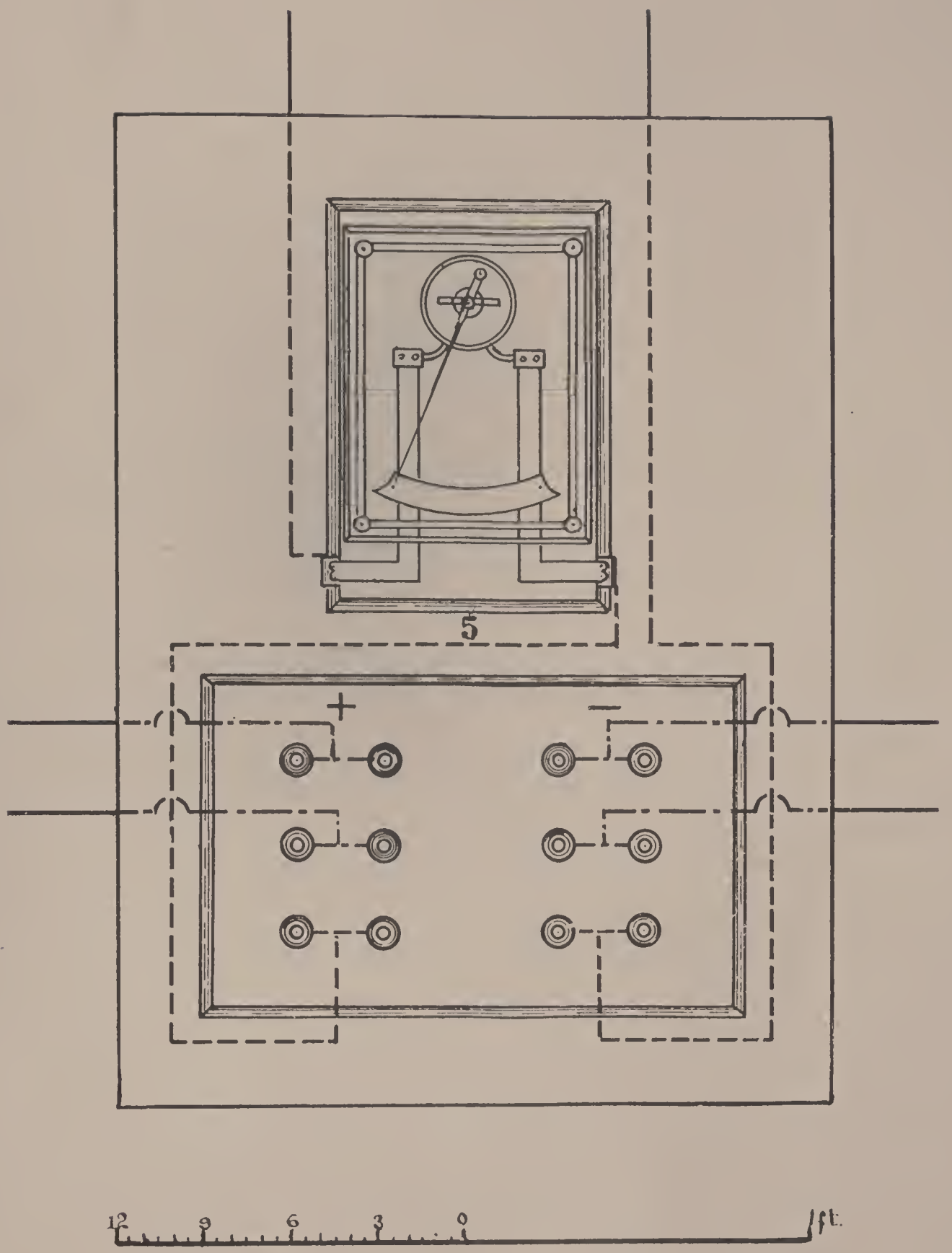


COMBINATION PLUG ARC SWITCHBOARD.

PLATE 31.

Switchboard Design for One Arc Dynamo and Two Circuits.

The diagram on the opposite page shows the proper connections and may be readily understood by any electrician or wireman.

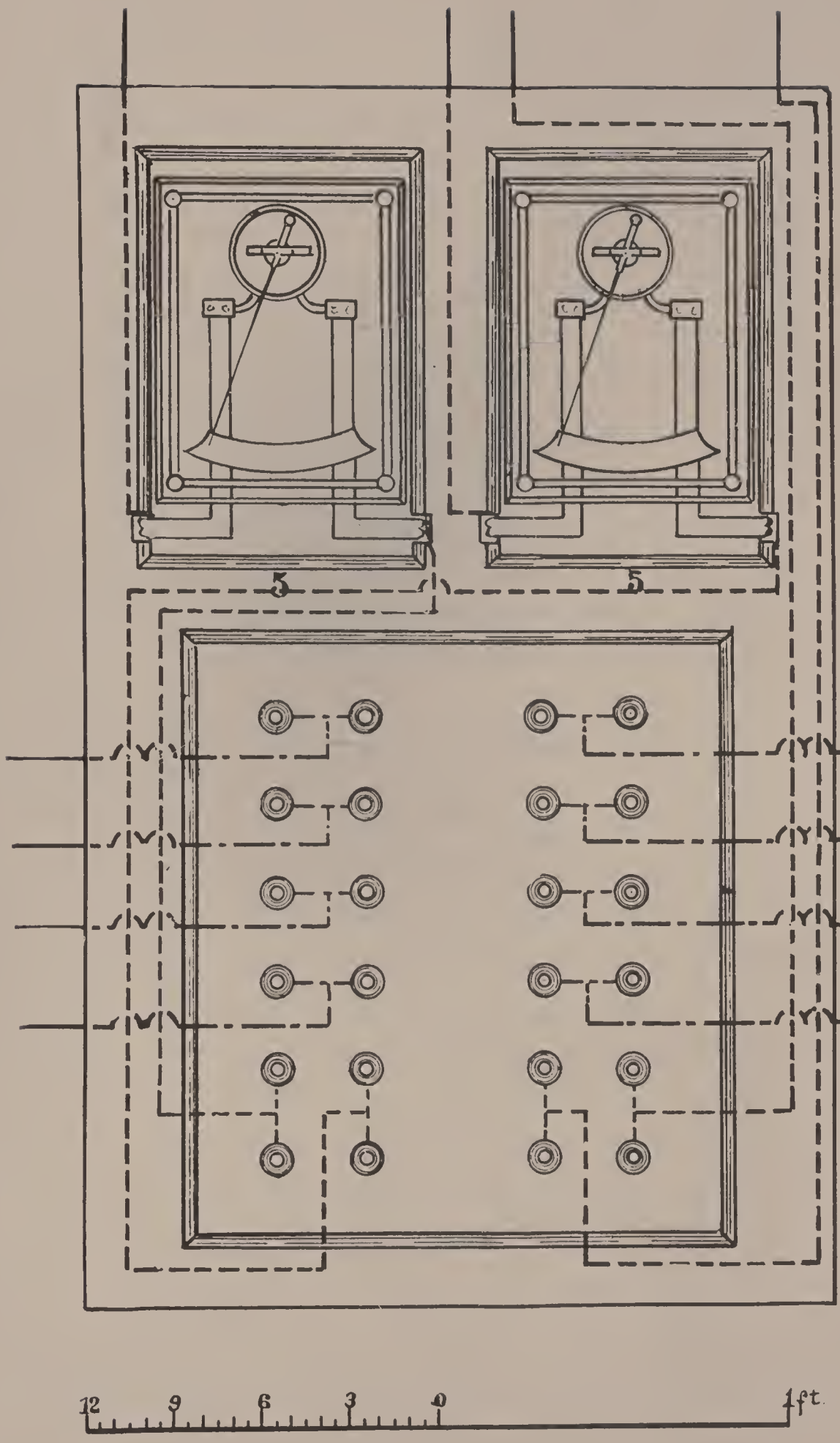


SWITCHBOARD FOR ONE ARC DYNAMO AND TWO CIRCUITS.

PLATE 32

Switchboard for Two Arc Dynamos and Four Circuits.

Plate 33 represents the wiring, plug terminals, etc., for two arc light dynamos and four circuits, showing the two ammeters properly connected.

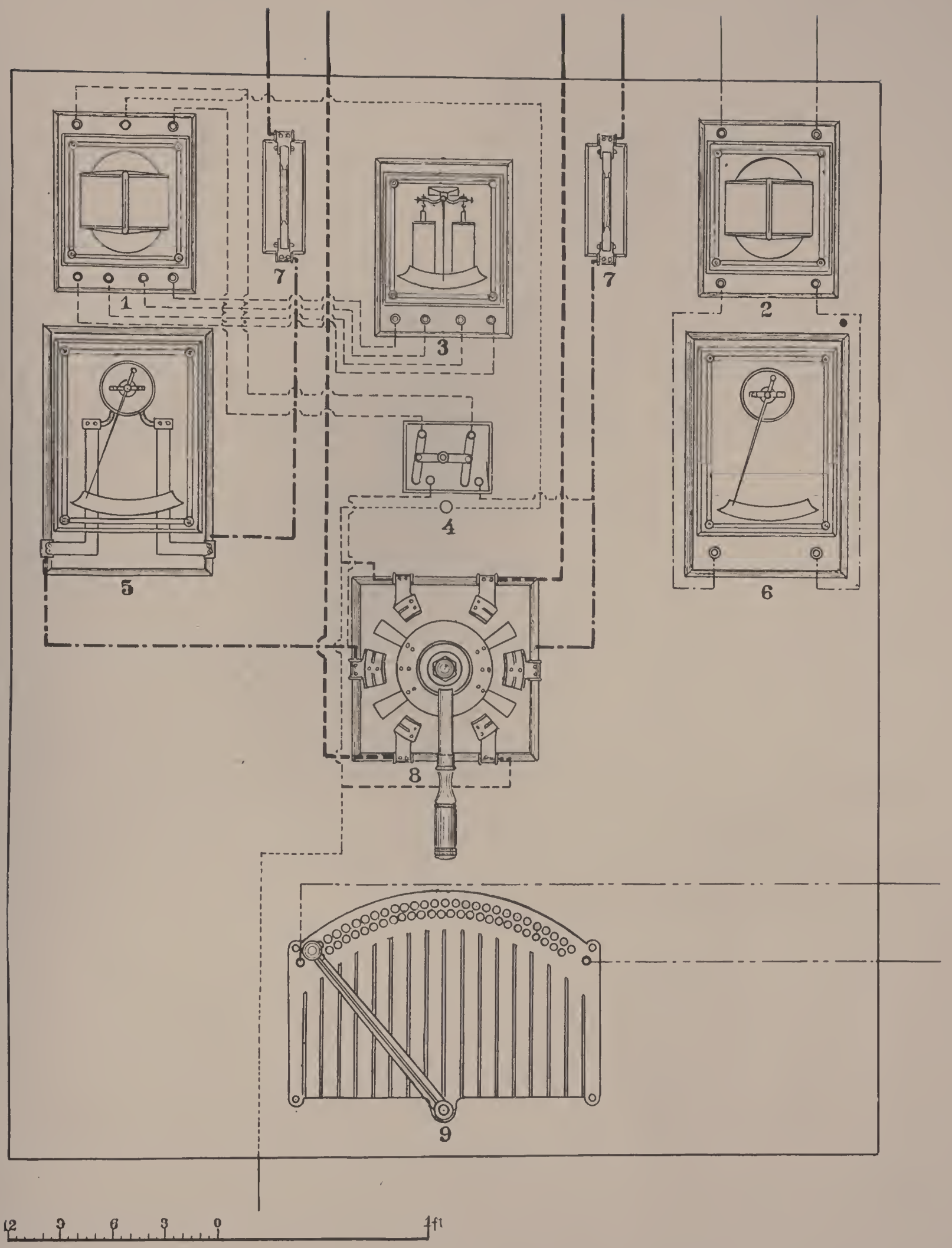


SWITCHBOARD FOR TWO ARC DYNAMOS AND FOUR CIRCUITS.

PLATE 33.

Switchboard for One Alternator and One Circuit.

THE plate on the opposite page represents the arrangement and complement of instruments necessary for correct manipulation of a plant embracing one alternator and one circuit — Fig. No. 1 being ground detector transformer and No. 3 ground detector; No. 2, voltmeter transformer; No. 5, ammeter; No. 6, voltmeter; No. 4, two-point switch on ground detector (one point being used to throw the ground detector out of circuit, the other point being connected to primary circuit, as shown); No. 7, high potential fuse terminal; No. 8, main line switch, and No. 9, exciter rheostat. The diagram for wiring is correct for use in all instances and should not be changed in any manner.

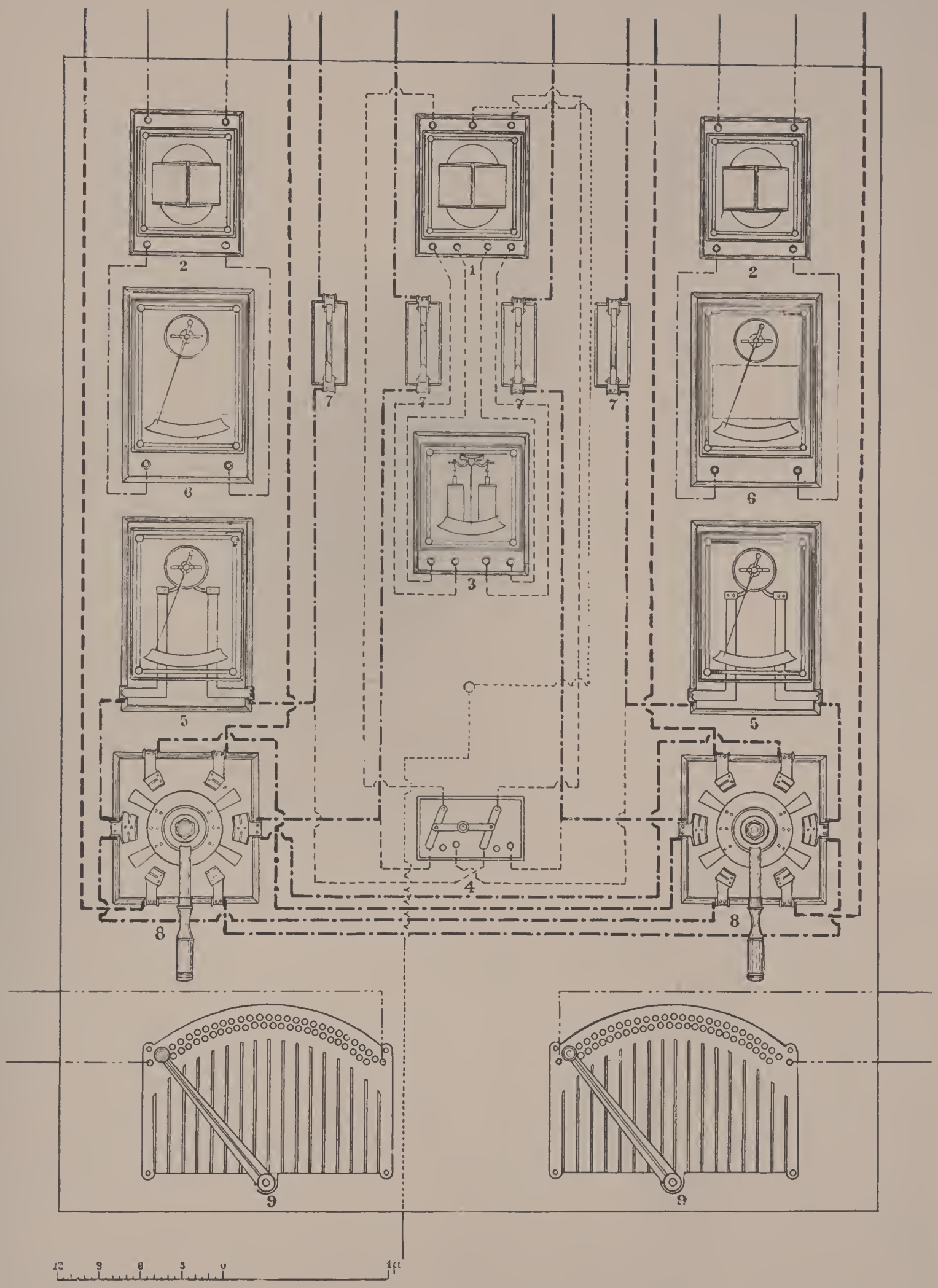


SWITCHBOARD FOR ONE ALTERNATOR AND ONE CIRCUIT.

PLATE 31.

Switchboard for Two Alternators and Two Circuits.

PLATE 35 shows our combination for the above mentioned plant equipment, the same numbers representing the same instruments as in the one mentioned on preceding page. The arrangement of the two main line switches is such that either circuit can be run on either alternator, or both circuits on either alternator, at pleasure. It makes no difference which circuit is on either one of the alternators, and a transfer of circuits can be made any time while current is on.



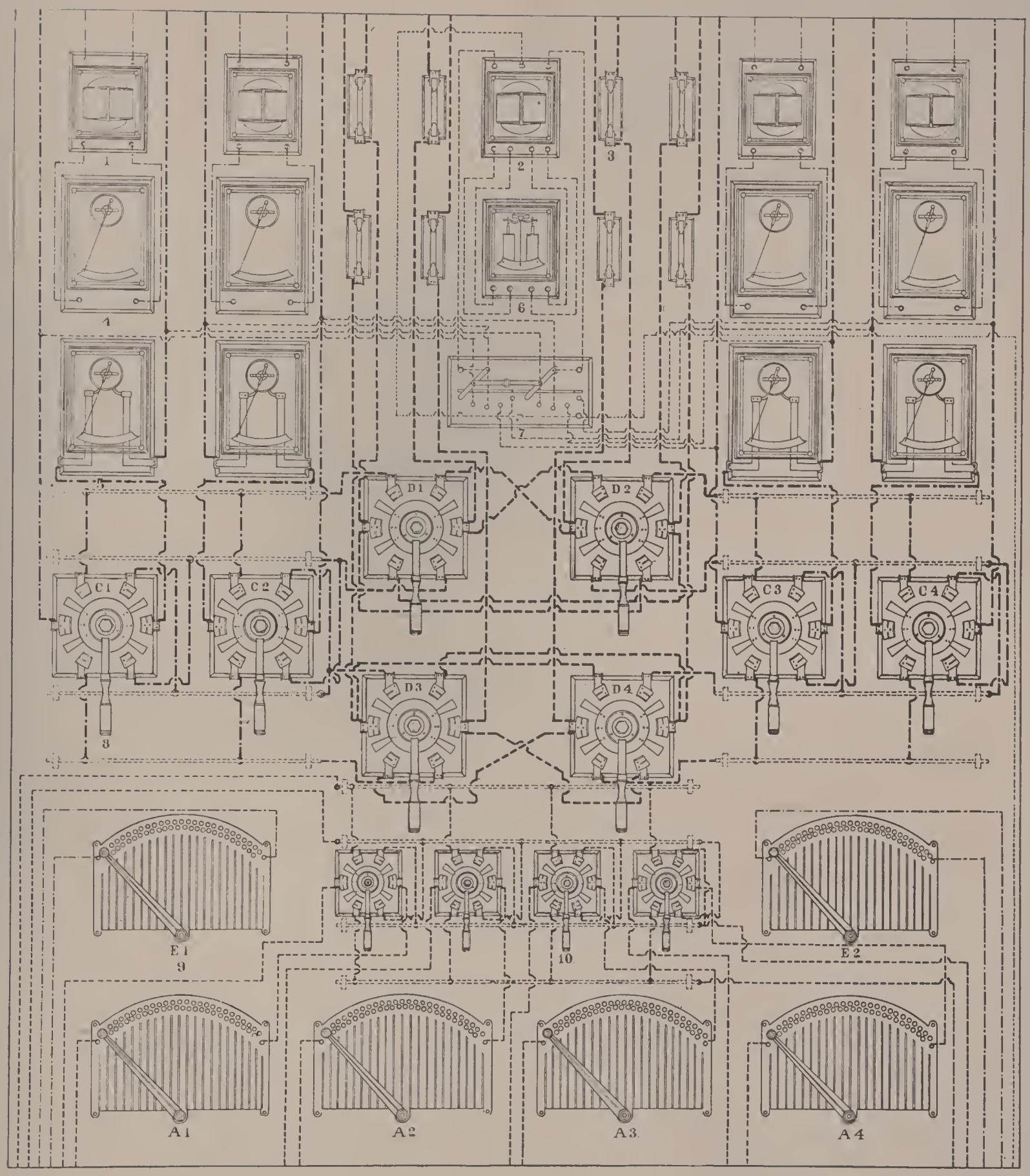
SWITCHBOARD FOR TWO ALTERNATORS AND TWO CIRCUITS.

PLATE 35.

Switchboard for Four Alternators and Four Circuits.

PLATE 36 represents an arrangement for operating four dynamos and four circuits, which has been most carefully considered in all of its details. The arrangement is such, that all four of the circuits can be operated on any one of the dynamos for a light load, or any one of the circuits can be run on any one of the dynamos, and any other arrangement or subdivision is possible that may be found necessary or advisable in any particular plant.

The diagram represents a plant equipped with only two exciters, with an arrangement of switches which enables one or more, or all of the alternators to be excited from either exciter. Any change in arrangement that may be desired before starting or while the full plant is in operation can be made with the certainty of not incurring any risk by way of short circuits, etc., during transfer, and with no possibility of doing damage to dynamos, transformers, or any of the accessories belonging to the plant. The wiring is shown in a manner which may be, at first sight, rather bewildering, but traced out by any intelligent wireman all points of contact can be very easily located.

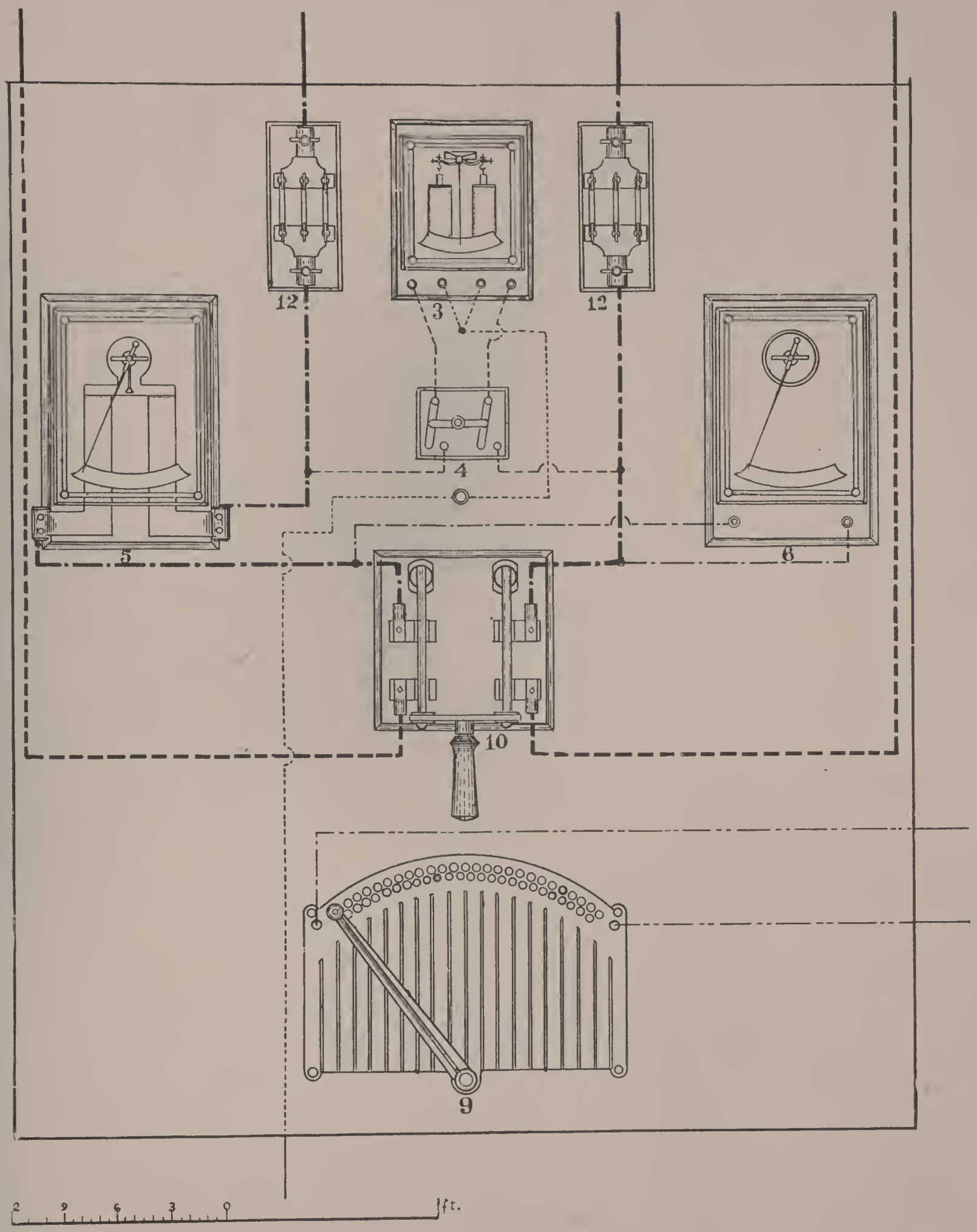


SWITCHBOARD FOR FOUR ALTERNATORS AND FOUR CIRCUITS.

PLATE 36.

Switchboard for One Direct Current Generator.

PLATE 37 shows complement of instruments and accessories necessary for the proper handling on one generator only — No. 5 being the ammeter; No. 6, voltmeter; No. 9, rheostat; No. 10, double pole switch for main line circuit; No. 3, ground detector, and No. 4, two-point switch for same. No. 12 shows our low potential fuse terminals. The wiring is so plainly shown that it needs no description.



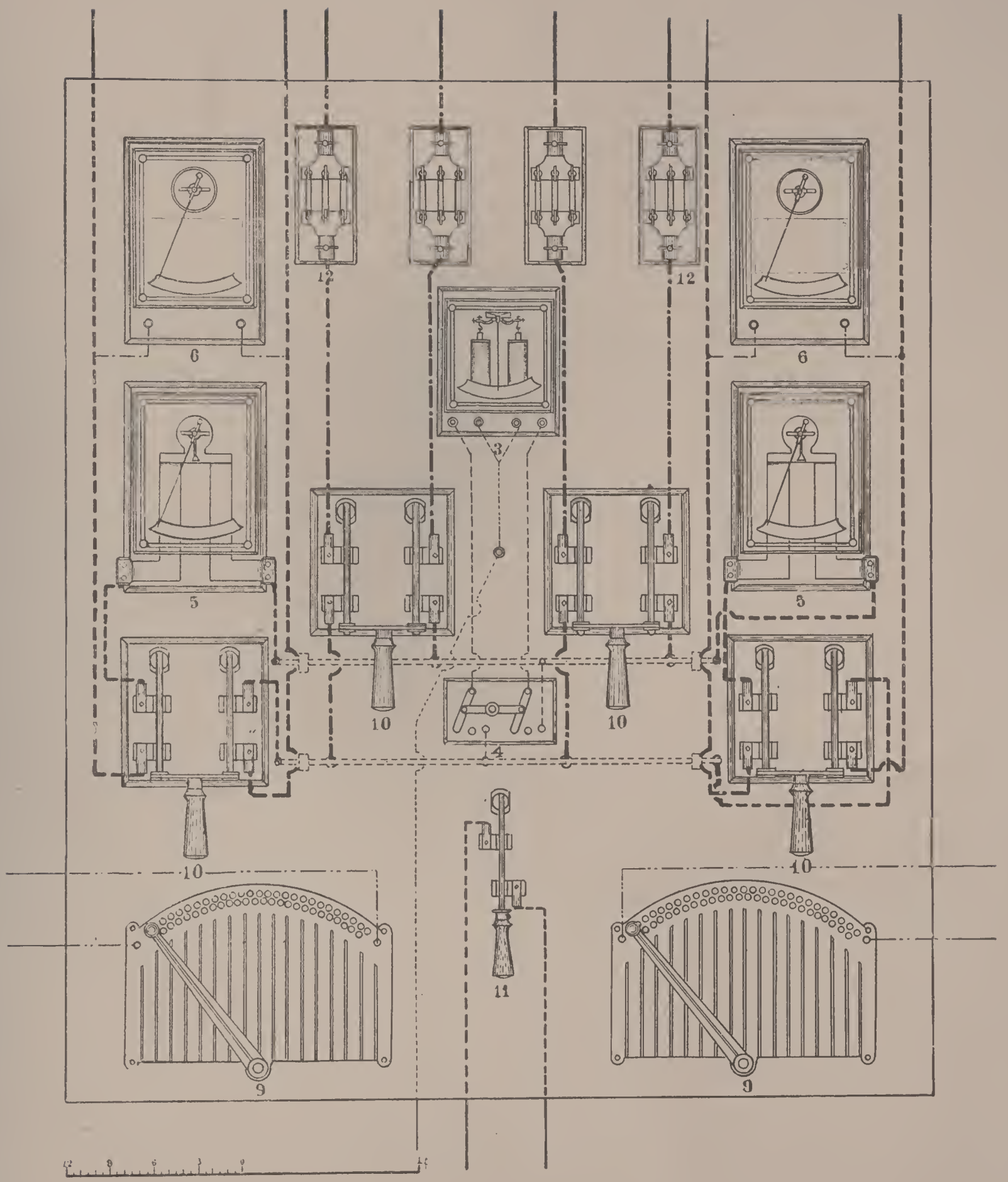
SWITCHBOARD FOR ONE GENERATOR AND ONE CIRCUIT.

PLATE 37.

Switchboard for Two D. C. Generators in Parallel.

PLATE 38 illustrates the arrangement for distribution by two circuits from one common source of supply, current being furnished either by one generator or by two generators in parallel. The corresponding numbers apply to the same instruments as in Plate 37, with the addition of No. 11, which is a switch for the equalizer bar.

The rheostats and shunt fields can be connected from the bus-bars or from the individual machine, as may be deemed best, but as it is not necessary to connect from bus-bars, we would advise that the connections on the machine as received never be changed.



SWITCHBOARD FOR TWO GENERATORS IN PARALLEL.

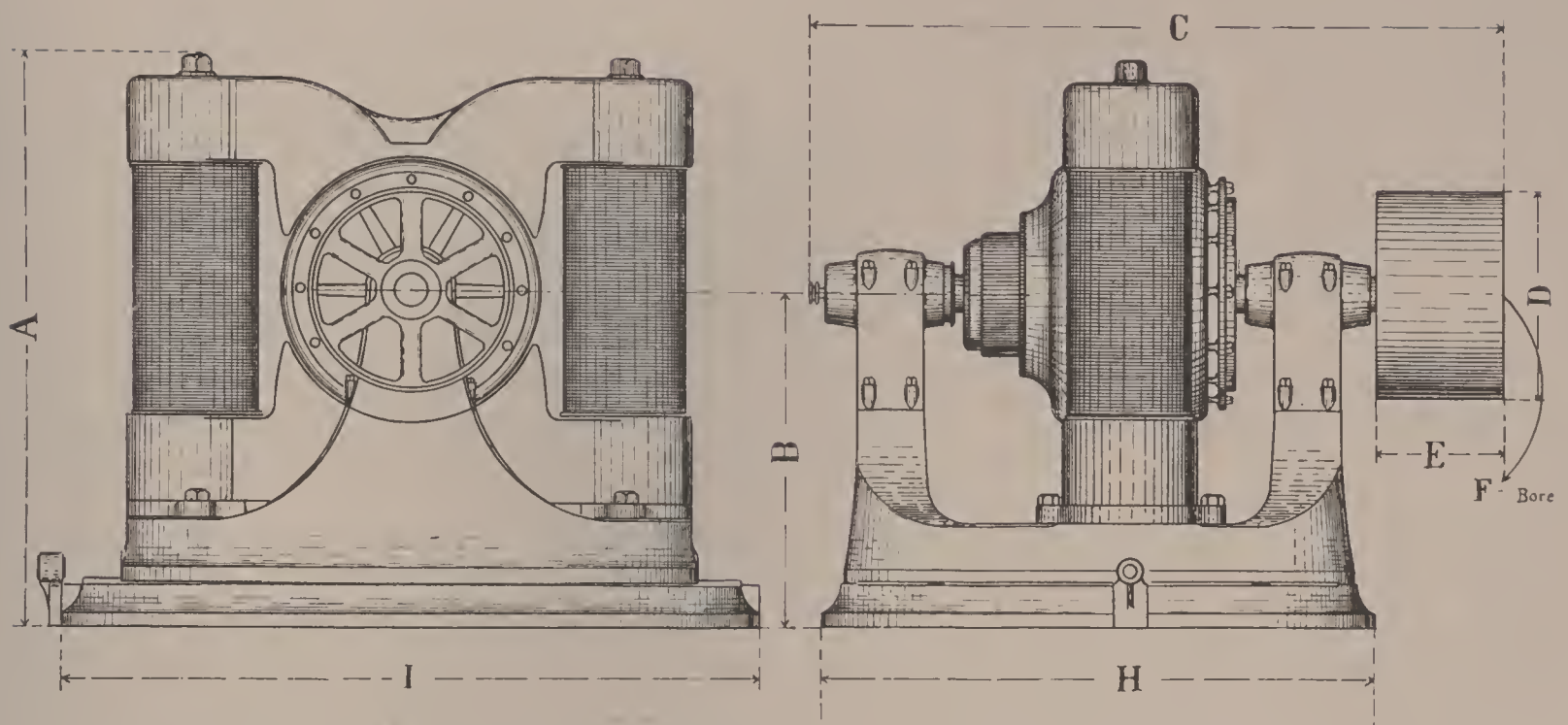
PLATE 38.

Dimension Diagrams.

The three plates following give the general dimensions of the arc, alternating and direct current dynamos.

DIMENSIONS OF

ARC DYNAMOS



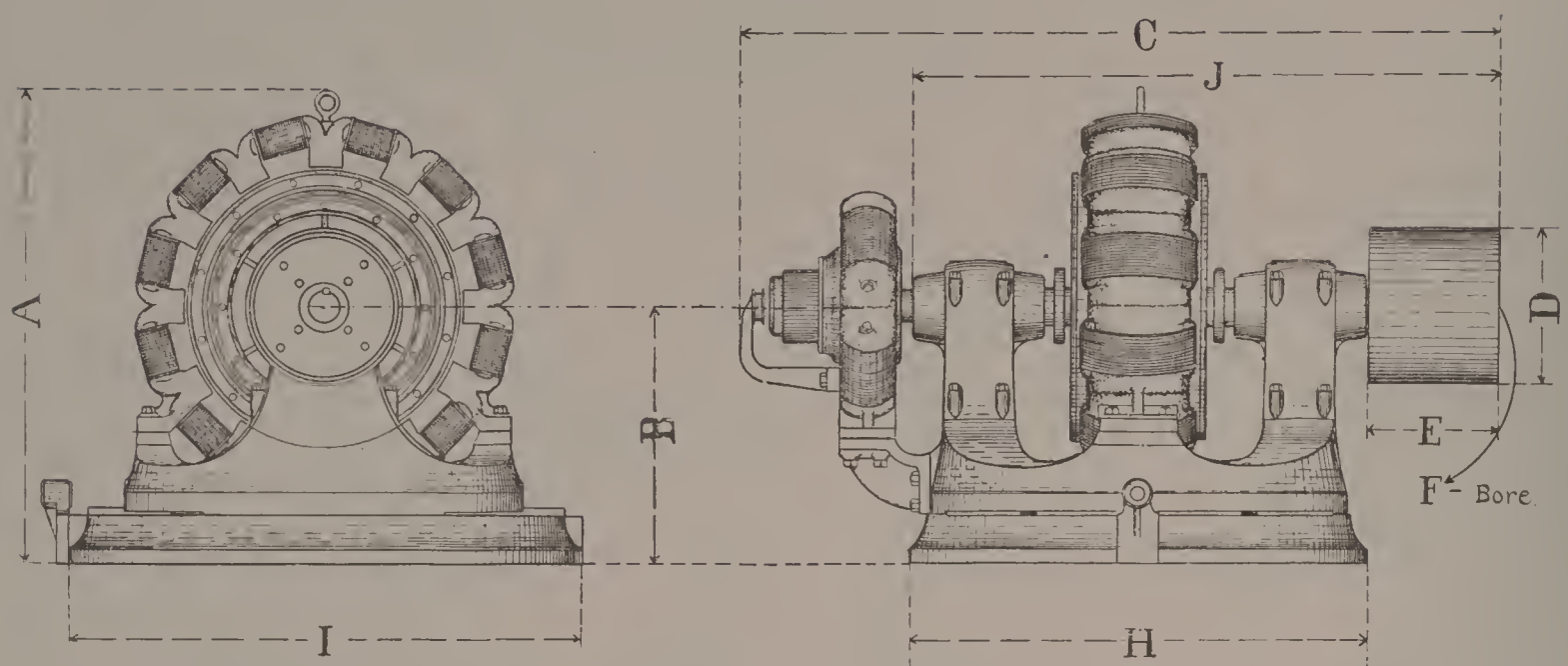
Class	20	30	40	50	60	80	100
Speed	1100	1100	1050	1000	900	800	475
No Lamps	20	30	40	50	60	80	100
A	34 7/8	35 3/8	43 1/4	43 1/4	46 1/2	54 1/4	74 3/4
B	21 1/16	21 11/16	26 3/32	26 3/32	27 5/8	32	43 1/4
C	44 7/8	47 3/8	58	58	62 1/4	65 7/8	78 1/2
D	12	12	14	14	16	18	20
E	8	8	10	10	12	12	12
F	2 1/16	2 1/16	2 1/2	2 1/2	3	3	4
G	19 3/4	20	26	26	28	29 5/8	34 1/2
H	36 1/2	39	45 3/4	45 3/4	48 3/4	53	63 3/4
I	46 3/4	46 3/4	53 3/8	53 3/8	57	66 1/4	86

This table refers to 2,000 c.-p. apparatus.

PLATE 39.

DIMENSIONS OF

ALTERNATING DYNAMOS.



K.W.	27	33	41	47	55	69	82
Speed	1300	1300	1300	1300	1100	1100	1100
No Lamps	500	600	750	850	1000	1250	1500
A	42¾	42¾	42¾	42¾	49	49	49
B	23¼	23¼	23¼	23¼	26⅛	26⅛	26⅛
C	68⅜	68⅜	68⅜	68⅜	77⅛	77⅛	77⅛
D	12	12	14	14	14	14	14
E	12	12	12	12	14	14	14
F	3	3	3	3	3	3	3
G	26 9/16	26 9/16	26 9/16	26 9/16	31	31	31
H	41½	41½	41½	41½	48¾	48¾	48¾
I	46½	46½	46½	46½	56½	56½	56½
J							

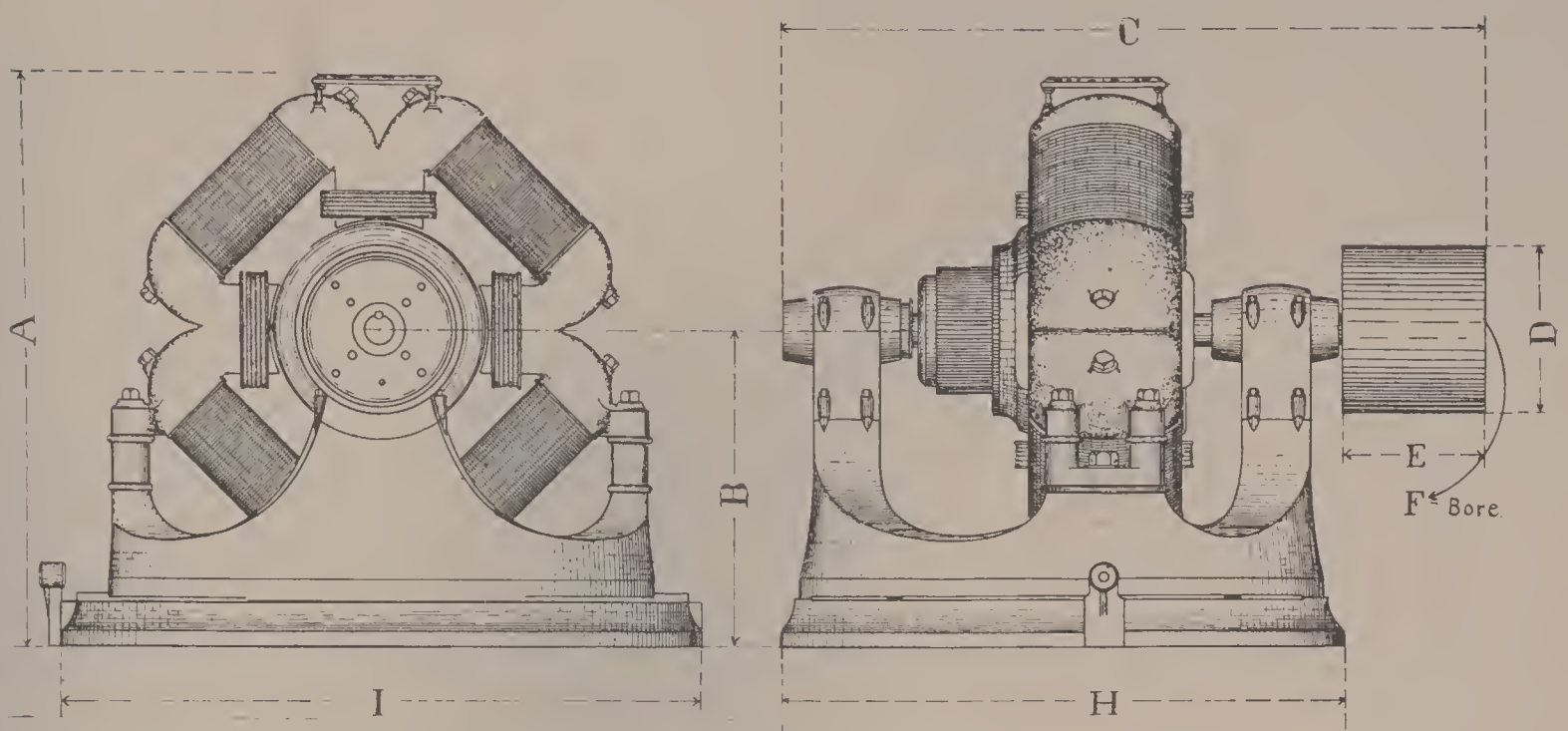
K.W.	55	69	82	137			
Speed	1100	1100	1100	860			
No Lamps	1000	1250	1500	2500			
A	49	49	49	63			
B	26⅛	26⅛	26⅛	35¾			
C							
D	14	14	14	20			
E	14	14	14	16			
F	13	3	3	4			
G	31	31	31	39			
H	48¾	48¾	48¾	63			
I	56½	56½	56½	68			
J	62	62	62	77¾			

Lower table refers to Alternators separately excited.

PLATE 40.

DIMENSIONS OF

MULTIPOLAR DYNAMOS.



K.W.	12	15	20	24	27	31
Speed	1050	1025	750	725	700	675
No Lamps	210	270	360	430	490	555
A	40	40	48	48	48	48
B	22 1/8	22 1/8	26 3/8	26 3/8	26 3/8	26 3/8
C	46	46	58 3/4	58 3/4	58 3/4	58 3/4
D	10	10	10	12	12	12
E	8	8	8	9	10	10
F	2 1/16	2 1/16	2 1/2	2 1/2	2 1/2	2 1/2
G	19 1/2	19 1/2	24 7/8	24 7/8	24 7/8	24 7/8
H	38 5/8	38 5/8	47 1/2	47 1/2	47 1/2	47 1/2
I	47	47	54 1/4	54 1/2	54 1/4	54 1/4

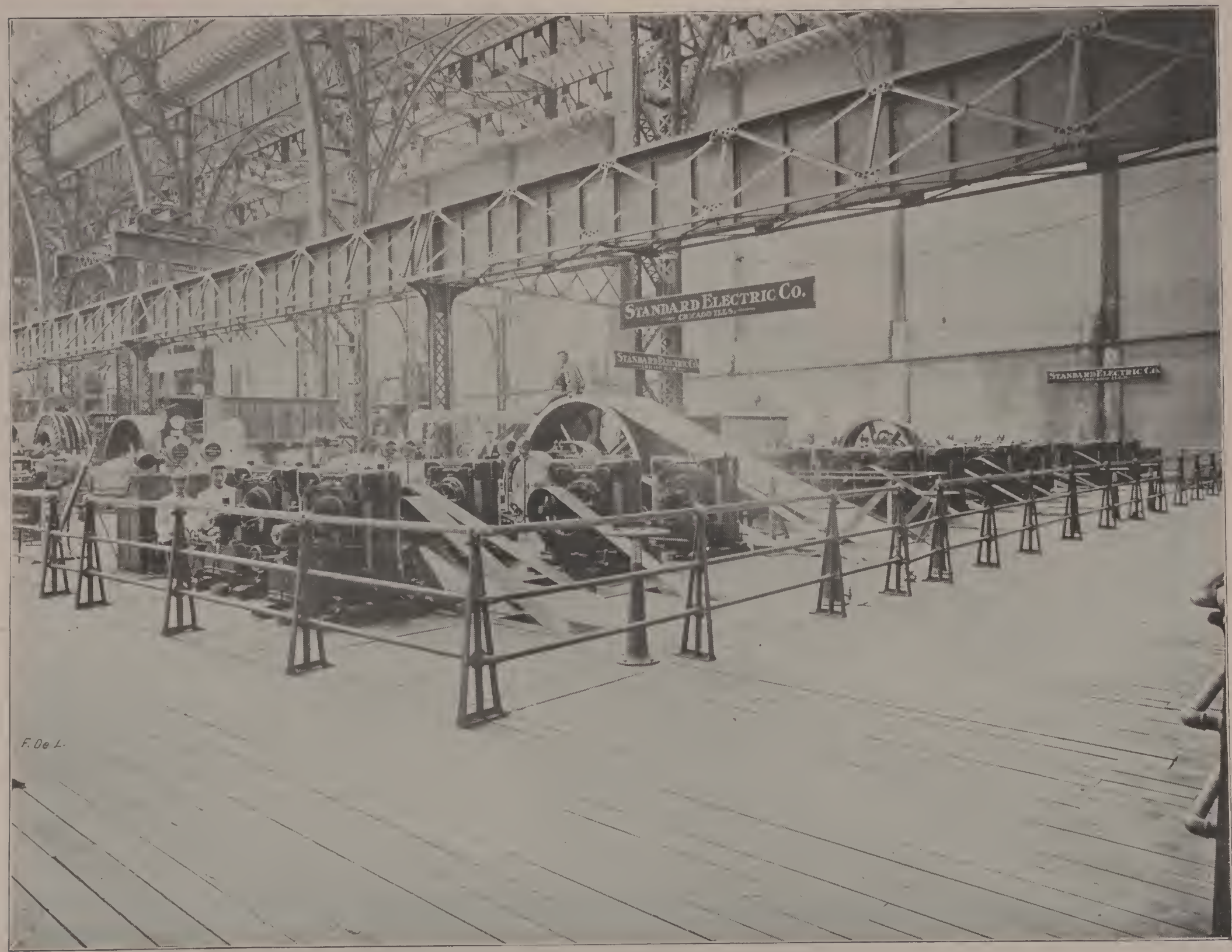
K.W.	45	60	75	130	225	
Speed	675	650	550	475	375	
No Lamps	800	1075	1345	2350	4000	
A	54	54	62	78	97 1/2	
B	30	30	34 1/2	42 1/2	54 1/4	
C	66 3/4	66 3/4	84 3/4	99	128 1/4	
D	14	14	18	24	28	
E	12	12	14	18	21	
F	3	3	4	4	5	
G	29 1/4	29 1/4	36 1/4	42 3/4	51 1/4	
H	53	53	68	80	97 1/4	
I	61	61	73 3/8	92	112 1/2	

PLATE 41.

World's Fair Service Plant.

AT the recent World's Columbian Exposition the Standard Electric Company made a phenomenal record with its service arc lighting plant, consisting of twenty-two 50-light dynamos and 1,150 Standard arc lamps. Twenty of these dynamos occupied the principal portion of Section S, Machinery Hall, the other two dynamos being in Section Q. The illustration on the opposite page is a representation of the plant as photographed during the "Fair."

During the six months of the Exposition this service plant produced 25,500,000 arc lamp hours, or nearly 20% more than any other arc plant at the Exposition. This marvelous output was accomplished without the loss of an armature or even an armature coil, a record which is unparalleled in the history of arc lighting. The commercial efficiency of this plant was much in excess of any other system represented. We are prepared to give further records and information upon application.



WORLD'S FAIR ARC LIGHTING SERVICE PLANT. TWENTY-TWO 50-LIGHT 2,000 C.-P. DYNAMOS.

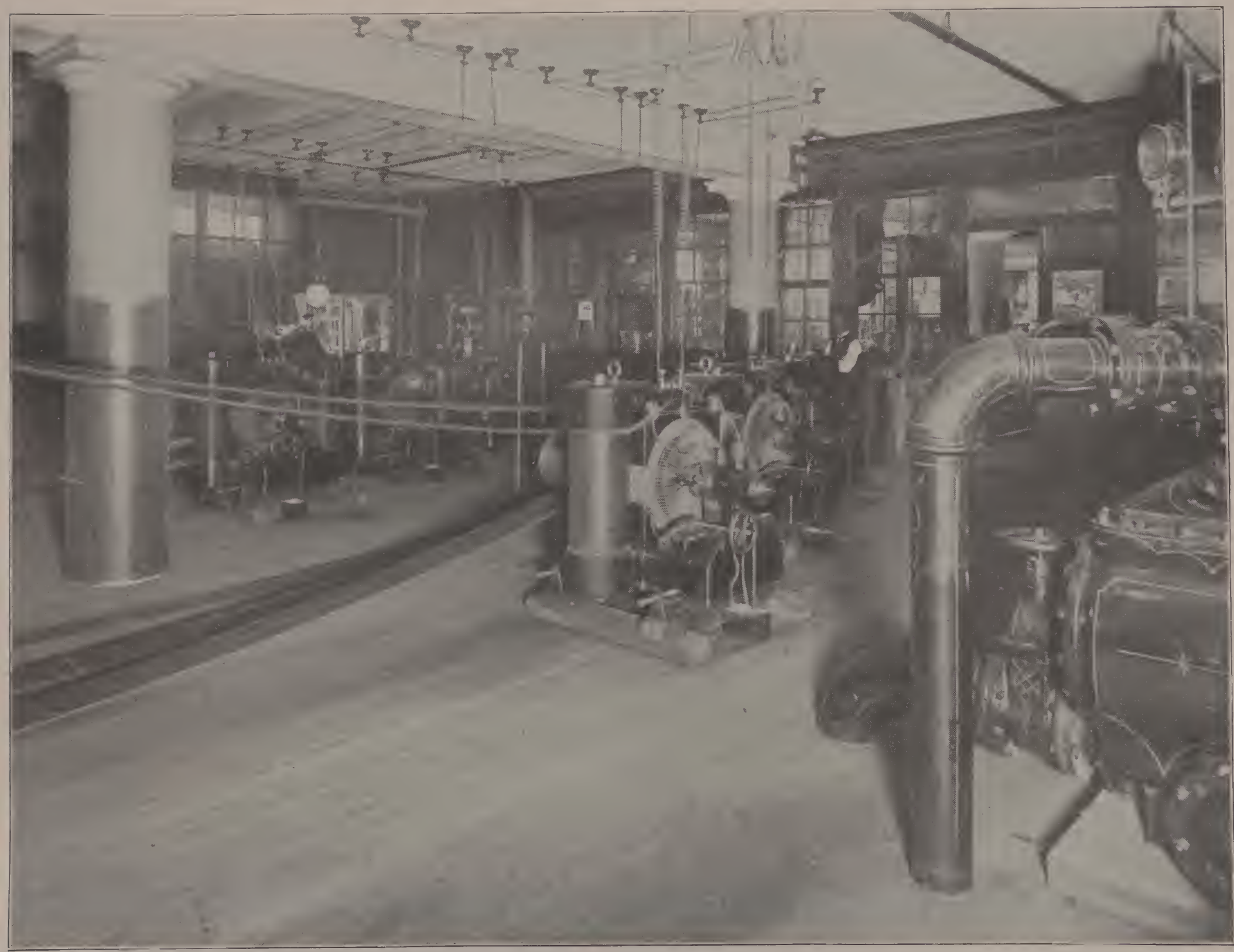
PLATE 42.

The Standard Arc System in Commercial Work.

IN addition to the widespread use of this system in the central stations and municipal plants throughout the country, many of the largest commercial institutions — notably the foremost dry goods houses — were among the first to recognize the desirability of having dynamos practically noiseless and perfectly reliable in operation, and lamps which are free from variations in light volume. The steady regulation of feed in the Standard lamp made its adoption for high-class commercial work almost a necessity.

One of the largest department stores in the United States, "The Fair," of Chicago, is equipped with twelve arc dynamos, six hundred arc lamps and two incandescent generators built by this Company. This plant is second to none in the commercial world. We have furnished ten or twelve of the largest stores in Chicago and many of the leading mercantile institutions in St. Louis, Detroit, Rochester, Louisville and Minneapolis, besides many mills and factories in all parts of the country, with arc lighting plants.

The plate on the opposite page represents the Standard arc plant in the new store of J. L. Hudson, Detroit, Mich. The installation has a capacity of two hundred arc lights and is a model one in every respect.



FIVE ARC DYNAMOS, J. L. HUDSON'S STORE, DETROIT, MICH.

PLATE 13.

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